DOCUMENT RESUME

ED 296 729 IR 052 385

AUTHOR Haravu, L. J.
TITLE Feasibility Study on the Application of Microcomputers to Library and Information Work at SEAMEO-BIOTROP.
INSTITUTION United Nations Educational, Scientific and Cultural Organization, Paris (France). General Information Programme.
SPONS AGENCY Southeast Asian Ministers of Education Organization, Bangkok (Thailand).
REPORT NO FMR/PGI/85/121; UNESCO-TR/RP/1984-1985/VII.1.3.
PUB DATE 85
NOTE 80p.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Reports - Research/Technical (143)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Budgets; Cataloging; Clearinghouses; Databases; Developing Nations; Documentation; *Information Services; *Library Automation; *Library Role; Microcomputers; *Online Systems; Serials; *Systems Analysis; Thesauri
IDENTIFIERS UNESCO

ABSTRACT

The result of a two-week consultant mission to the South East Asian Ministers of Education Organization (SEAMEO) at Bogor, Indonesia, this study explored the feasibility of applying microcomputers to library and information work in the Clearing House for Information Division of BIOTROP, which has a regional responsibility for the collection, storage, retrieval, and dissemination of tropical biological information. The study focused on: (1) the identification of functions that are considered good candidates for automation (these were found to be cataloging, serials control, exchange and mailing list management, database creation, current awareness listing, interactive search, thesaurus development, and ongoing research information systems); (2) the determination of major requirements that systems considered for automation would need to satisfy; (3) the consideration of what microcomputer hardware and software would be needed to meet systems' requirements; (4) presentation of data pertaining to availability of microcomputers in Indonesia; (5) examination of the feasibility of on-line access to external databases; and (6) suggestions for an action plan and budget for a project to implement microcomputer-based systems in the clearinghouse. Major requirements that microcomputer-based systems in each of these areas should satisfy are delineated and discussed, the methodology is presented, and six figures and a data sheet are appended. (CGD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED296729

Restricted
Technical Report
RP/1984-1985/VII.1.3

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SOUTH EAST ASIAN MINISTERS OF EDUCATION ORGANIZATION (SEAMEO)

Regional network for the exchange of information and experience in science and technology in Asia and the Pacific (ASTINFO)

Feasibility Study on the Application of Microcomputers to Library and Information Work at SEAMEO-BIOTROP

by L.J. Haravu

Serial No. FMR/PGI/85/121

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
C.Coudert-Schklowski
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

IR053355

United Nations Educational,
Scientific and
Cultural Organization

Paris, 1985

BEST COPY AVAILABLE

S E A M E O

FEASIBILITY STUDY ON THE APPLICATION OF MICROCOMPUTERS TO LIBRARY AND INFORMATION WORK AT SEAMEO-BIOTROP

by L.J. Haravu

Report prepared for the
South East Asian Ministers
of Education Organization
(SEAMEO)
by the United Nations
Educational, Scientific
and Cultural Organization
(Unesco)

UNESCO

Technical Report
RP/1984-1985/VII.1.3
FMP/PGI/85/121(Haravu)
19 March 1985

© Unesco 1985

Printed in France

TABLE OF CONTENTS

	Pages
Conclusions and recommendations	v
I. Introduction	1
II. Methodology	4
III. Functional analysis and identification of potential areas for microcomputer applications	5
Library functions	6
The Acquisitions function	6
The Cataloguing function	7
Serials control	9
Exchange and mailing list management	10
Circulation control	11
Documentation and information service functions	11
Thesaurus development	15
Ongoing research information system	15
Publications function	16
IV. Specifications of requirements	18
The cataloguing system	18
The serials control system	21
The mailing and exchange list system	23
Data base creation, SDI and current awareness system	24
Thesaurus development system	30
V. Hardware and software considerations	33
VI. Utilization of external data bases	43
Offline use of external data bases	43
Feasibility of on-line use of data bases	45
VII. Suggested plan of action	49
Priorities in implementation	49
Plan of action	49
Training requirements	52
Budget considerations	53

Pages

Appendices

Appendix-I

Organization and staffing of the Clearing House of the BIOTROP Information Division 55

Appendix-II

Data flow diagram of existing procedures within the book acquisitions function at the Clearing HOuse, BIOTROP 56

Appendix-III

Data flow diagram for the cataloguing and accession listing function at BIOTROP 57

Appendix-IV

Data flow diagram for database (card index) creation and production of monthly list of indexed articles 58

Appendix-V

Data sheet for on-going research project progress information 59

Appendix-VI

System flow chart of proposed cataloguing system 61

Appendix-VII

System flow chart for the integrated database creation, SDI, current awareness listing and interactive search system 62

CONCLUSIONS AND RECOMMENDATIONS

The study

The feasibility study is the result of a two-week consultant mission to SEAMEO-BIOTROP at Bogor, Indonesia undertaken on behalf of Unesco. The study is concerned with feasibility of applying microcomputers to library and information work in the Clearing House for Information Division of BIOTROP. The Clearing House has a regional responsibility for the collection, storage, retrieval and dissemination of tropical biological information.

The study has attempted the following tasks:

- Identification of functions that are considered good candidates for automation- i.e., those functions which if automated will provide benefits of one kind or another to the Clearing House and/or its users.

- Determination of major requirements that systems considered for automation would need to satisfy.

- Consideration of microcomputer hardware and software needed to meet requirments of systems considered for automation.

- Presentation of data pertaining to availability of microcomputers in Indonesia.

- Examination of the feasibility of on-line access to external data bases.

Finally the study suggests an action plan and budget for a project to implement microcomputer-based systems in the Clearing House.

Findings and recommendations

The following functions are considered to be good areas for automation:

- Cataloguing

- Serials control

- Exchange and mailing list management

- Data base creation, SDI, current awareness listing and interactive search

- Thesaurus development

- On-going research information system

- Word processing and text editing functions required be done by the Publications Section

The major requirements that microcomputer-based systems in each of these areas should satisfy are delineated. The requirements specifications spelt out in the report will hopefully serve as the basis for further system development. The major requirements that each of the systems should fulfill are briefly give below.

Cataloguing system

The cataloguing system which should be menu driven will enable interactive entry of cataloguing data and permit interactive corrections, amendments or deletion of disk-held catalogue records. The system will produce as output, ready-to-file catalogue cards and hard copy of accessions lists ready for offset duplication. In addition, the system will enable the archiving of cataloguing data in a communications compatible format. The system will eliminate the multiple keyboarding effort required to manually produce catalogue cards and a product such as an accession list. It will also relieve professsional staff from proof reading of the same record occuring in different products. A long term benefit of the system will be the capture of cataloguing data in machine-readable form. This would enable the conversion of the existing card catalogue into an on-line catalogue at a future date enabling interactive access to the catalogue. The possibility of using a microcomputer as a front-end to a mini or mainframe computer with file transfers between the two will enable the future development of an on-line catalogue.

Serials control system

The serials control system will also be menu driven and provide the following options:

- Interactive data-entry to create the master serials data file

- Checking-in or registration of periodicals issues

- Claiming of overdue issues

- Preparation of binding lists

- Output holdings lists

- Preparation of current list of periodicals

Data base creation

The report discusses the two alternatives available for it to create and maintain a bibliographic data base and to provide SDI, interactive search and current awareness services. The first alternative is to use a subset of an international data base such as AGRIS to provide different services. The second alternative is to create the data base using for input the primary and secondary journals received by the Clearing House.

The report discusses the advantages of the former alternative and recommends that this alternative as a means of creating its data base may be examined in a separate feasibility study. It also recommends the funding of a limited project to use downloaded diskettes from BIOSIS which is already offering sections of the data base on microcomputer diskettes.

In the short-run, however, a system to create the data base using local input is suggested and the requirements of such a system are discussed. The system will enable interactive data entry of bibliographic records and enable indexed access to several fields of the records. The system will also enable the creation of SDI profiles interactively and their amendment or deletion. A batch-oriented SDI search module will be part of the system and will produce SDI outputs. The system will also enable the cumulation of the bibliographic data base and indexes, and enable the interactive search of the cumulated data base. Also the current bibliographic file will be able to be sorted by a group code to enable the production of hard copy for one or more current awareness lists in well defined areas of tropical biology.

The system will enable several information products and services to be produced from a single keyboarding effort. An important benefit of the system will be the capability to provide an SDI service tailored to meet individual needs of scientists not only at BIOTROP but elsewhere in the region. The system will also enable the Clearing House to be able to respond quickly to information requests made to it.

Thesaurus development

The study recommends that thesaurus development in the Clearing House may be thought of as the development of a micro thesaurus to AGROVOC rather than as a thesaurus in its own right.

A microcomputer system to add new term networks to the thesaurus, for the generation of inverse entries, for the interactive correction of term networks and for the output of the thesaurus is suggested.

On-going research information system

A system to store data on on-going research at BIOTROP and to search, display and output the data is suggested so as to make better use of such data. The possible benefits of the system to the

scientific and to the management of BIOTROP are described.

Exchange and mailing list system

The Clearing House is responsible for the dissemination of BIOTROP's research findings to individuals and institutions in the region. The Clearing House also exchanges BIOTROP's serial and non-serial publications with other institutions all over the world.

A system for the storage, search and output of the mailing and exchange list is recommended. A commercial list management package is considered adequate for this purpose.

Word processing applications

The Publications Section offloads BIOTROP's publications to printers at Bogor or Jakarta since BIOTROP does not have printing facilities of its own. This has resulted in long delays in producing the different publications.

The use of a word-processing package on the Clearing House's microcomputer is recommended for the creation of text files on diskettes enabling the same to be edited on-line, formatted and output. A good letter quality printer is recommended so that the output can be offset printed. A paper-master making equipment is recommended to be added to complement the small offset printing machine already available at BIOTROP.

It is envisaged that access to word-processing and small offset reproduction facilities will enable the publications section to produce its publications quickly and at considerably less cost than at present.

Hardware considerations

The microcomputer required to implement the automated systems suggested in the report should fulfill the following requirements:

- It should be based on 16 bit architecture and have a RAM of 256 with the possibility of its expansion to 512K bytes.

- It should support a hard disk of atleast 10Mb and floppy diskette storage of upto 1Mb. It is considered useful that it should have 2 floppy drives.

- It should emulate the terminals of well known mini or mainframe computers and be capable of participating in file transfers to and from such computers.

- It should support communications protocols for access to data networks outside Indonesia.

- It should be capable of being used in a Local Area Network for possible distributed processing at a later date.

The availability of microcomputers in Indonesia and the costs of providing a minimum configuration with hard disk and associated system and utility software is presented. Less than $10,000.00 is estimated as needed to provide a microcomputer meeting the minimum requirements, including a letter-quality printer.

Software considerations

The IV+V system package developed by the Institut fuer Maschinelle Dokumentation (IMD), Graz, Austria, and currently under study by Unesco for dissemination and use in developing countries is a generalized data base management package oriented to bibliographic data base applications on microcomputers which has all the features necessary for it to be used in implementing the cataloguing; data base creation and search; and on-going research information systems. The IV+V system may eventually also be used for the serials control and thesaurus development systems. However, the possibility of using the IV+V for these two systems will need to be examined carefully. A commercially available list management package is adequate to automate the mailing and exchange list being maintained by the Clearing House.

In view of the obvious usefulness and advantages of the IV+V system, it is recommended that the package be provided under Unesco auspices network to BIOTROP after ensuring that the terms and conditions for its use are mutually agreed upon.

Feasibility of on-line access to data bases

INDOSAT, the Indonesian Satellite Telecommunications agency has begun offering since July 1984 access to data networks outside Indonesia through the public switched telephone network (PSTN). Transmission speeds of 300 and 1200 bps will be available. Terminals and modems will be available on hire from INDOSAT. Users will be allowed to import modems and terminals as long as they conform to technical requirements laid down by INDOSAT. The costs of access, like elsewhere, will be based both on time of usage and volume of data transmitted. It is estimated that the average telecommunication cost of accessing a data network in the USA will work out to US $45.00 per hour. Based on such a figure, it is estimated that a typical on-line search using 15 minutes of connect time of a host, eg. DIALOG, and outputting 200 references with abstracts would come to about $80.00. The telecommunication cost is only 15% of the total cost of a typical on-line search.

Interviews with scientists at BIOTROP indicate that there is need for the Clearing House to be able to conduct on-line searches as this would save them considerable time and effort, and ensure that they will have access to information useful in planning their research projects and in obtaining a better take-off point for their research.

It is recommended that the Clearing House should add a new dimension to its services by providing on-line search services although on a well considered and selective basis to its clients not only at BIOTROP but elsewhere in the region. The availability of access to data networks outside Indonesia at a reasonable cost has made on-line searching a feasible proposition in Indonesia.

Action plan

An action plan comprising the following phases is suggested:

- Tendering for a microcomputer
- Design and development
- Testing and evaluation
- Training of Clearing House staff
- Implementation

The above phases need not necessarily be sequential in operation.

It is suggested that a specialist in the IV+V system be provided to the Clearing House to work closely with the professional staff of the Clearing House to define implementation specifications based on the broad requirements specifications given in this report. The specialist then would develop and test in his own institution one on two applications using the IV+V system and the implementation specifications developed jointly with the Clearing House. In the second phase of work, after the IV+V system package is installed on the Clearing House's microcomputer, systems developed by the specialist would be tested at the Clearing House. This period will also be used for on-the-job training of the Clearing House staff and for implementation of one on perhaps two new systems in parallel with existing systems until the new systems may be considered fully operational and stable. It is envisaged that the close interaction of the specialist with the Clearing House staff will enable the staff to take over and run the systems developed for them.

In addition to on-the-job training, it is recommended that one staff member of the Clearing House may be deputed to a course on IV+V proposed to be held by Unesco in collaboration with the IMD.

The total duration of the above programme is estimated to be about one year, during which it is proposed that the data base creation and SDI system, the cataloguing system and the exchange and mailing list system could be made operational.

It is suggested that the Clearing House may take the first step in making potential users in the Bogor area more aware of its resources and services, and of its proposals to initiate an SDI service. The need to build a good rapport with potential users and in understanding their needs cannot be overemphasized in the planning for and successful implementation of an SDI and other information services.

Project costs

The estimated costs of different components of the above described project to implement these microcomputer applications in the Clearing House are as follows:

1. Microcomputer hardware, software and letter quality printer	$ 10,000
2. Plain paper copier (for paper master making)	$ 2,000
3. Training of one staff member in use of the IV+V system (Travel plus per diem for 2 weeks)	$ 2,500
4. Training within Indonesia	$ 500
5. Approximate cost of specialist for 4 weeks of on-site work and off-site work, travel and per diem for 2 missions of 10 days each (perhaps one mission of the responsible BIOTROP staff member to the specialist's institution and another of the specialist to BIOTROP)	$ 6,000
Total	$ 21,000

Multilateral or bilateral assistance could be requested to meet the costs of items 1 and 3 (since the writing of this report in its initial version these components have been implemented by Unesco under its Regular Programme). It is suggested that BIOTROP may fund items 2 and 4 in full. It is also suggested that BIOTROP may consider requesting multilateral or bilateral assistance to meet the costs of item 5, perhaps under the Unesco programme and/or the proposed project for a regional Weed Science Information Centre at BIOTROP to be supported by IDRC. The availability of a microcomputer at the Clearing House and the possibility of creating a data base and searching it will undoubtedly contribute to the effectiveness of the regional information centre on weeds proposed to be established at BIOTROP.

INTRODUCTION

1. The mission described in the present report was carried out from July 18 to August 3, 1984 at the request of the Regional Centre for Tropical Biology of the South East Asian Ministers of Education Organization (SEAMEO/BIOTROP) and the Government of Indonesia, and was funded by Unesco under its Regular Programme for 1984-1985. The terms of reference of the consultant mission were as follows:

(a) To examine current and planned procedures at BIOTROP in the library and information fields;

(b) To assess the requirements for phased and integrated automation of the above procedures and services including consideration of:

- hardware with special reference to the use of microcomputers;

- software for creating local data bases of bibliographic; and functionally related records;

- on-line access to remote data bases if feasible;

- local use of external data bases;

- exchange of data bases with other institutions;

- input to international and regional information systems;

- personnel and resources corresponding to the above points; and

(c) To develop a budget and detailed work schedule for the implementation of a programme for computerization including needs for international assistance in 1984-85 taking account of the resources likely to be available through Unesco and other concerned organizations.

2. The mission to BIOTROP was preceded by a 2-day briefing with Dr.Walter Koch, Head of the Institut fuer Maschinelle Dokumentation (IMD), Graz, Austria. Dr.Koch was met at the National Institute of Oceanography (NIO), Goa where he was on a Unesco mission. The briefing was to get a better understanding of the requirements, capabilities, and limitations of the IV+V system software package developed by IMD, and if possible to see the package in operation at the NIO.

3. The briefing with Dr.Koch was useful in getting a better appreciation of the design philosophy of the IV+V system. The briefing also helped clarify matters regarding the current status of development of the IV+V system package and its availability on

different microcomputers and operating systems. The package, however, could not be seen in operation at NIO.

SEAMEO-BIOTROP

4. BIOTROP is one of the seven centres/projects established by SEAMEO with the purpose of promoting cooperation among Southeast Asian nations through activities in science, education, and culture.

5. BIOTROP has three professional programmes, viz. Tropical Forest Biology, Tropical Agricultural Pest Biology, and Tropical Aquatic Biology. Each of these programmes has subprogrammes responsible for research, training, and consultancy in broad areas. For instance, the Tropical Forest Biology programme has the subprogrammes, viz. Forest Ecosystem Management, Forest Genetic Resources, Biological Aspects of Silviculture and Forest Ecology. Each subprogrammes' research work is project-oriented. The projects to be taken up by the subprogramme are known in advance for each 5-year development plan of BIOTROP.

6. The stated objective of BIOTROP is to assist the SEAMEO Member States (Indonesia, Kampuchea, Laos, Malaysia, the Philippines, Singapore and Thailand) to identify biological problems, the solution of which will enhance economic development in their respective countries, and to that end, to undertake research, publication and training programmes and other related activities within and outside Indonesia.

7. In attaining this objective, BIOTROP's functional goals are to identify important and critical biological problems in the region; assign priorities to these problems and develop programmes with a view to solving the most critical ones through mission and programme-oriented research, development of new research methodology and principles, conduct of subject area research where necessary to fill gaps in knowledge needed for specific problem solution; and translation of research knowledge into action programmes in cooperation with the appropriate organizations.

8. An important functional goal of BIOTROP is to disseminate information on the Institute's programmes, achievements and research findings to scientists, appropriate organizations, and key persons in the region, to act as a Clearing House for the storage and exchange of tropical biological information within the region, and to foster international cooperation, communication and exchange of scientific information among biologists and other scientists interested in tropical biology and environment.

9. In order to attain this goal, BIOTROP has a Clearing House of Information Division (hereinafter referred to as the Clearing House). The Clearing House is further divided into the library, scientific information, publications and public relations sections. The organization chart of the Clearing House is given in Appendix 1.

10. The present study is concerned with the activities of the Clearing House, and the desirability and feasibility of applying

microcomputers to some of its operations, procedures and services. The report has attempted the following tasks:

- identification of functions that are considered good possibilities for automation, i.e., those functions which if automated will provide benefits of one kind or another to the Clearing House and/or the users of the Clearing House

- determination of the major requirements that systems considered for automation would need to satisfy

- consideration of microcomputer hardware and software required to meet the requirements of systems

- presentation of data pertaining to microcomputer availability in Indonesia

- examination of the feasibility of on-line access to external data bases

11. Finally the study suggests an action plan and budget for a project to implement microcomputer-based systems in the Clearing House.

12. In conducting the feasibility study, the following approaches have been used to collect data, information and opinions considered useful in arriving at conclusions and alternatives for computer applications at the BIOTROP Clearing House.

(i) Discussions with the professional staff of the Clearing House and observation of the operations, tasks, and procedures leading to the provision of library and information products and services.

(ii) Study of the job descriptions of the professional staff and the extent of their actual involvement in non-professional or clerical tasks, which if automated would lead to more professional man-hours becoming available for improvement in quality of services and/or new services, or more timely and efficient services.

(iii) Data flow anlaysis of important procedures in the Clearing House. Data flow analysis has been done using the conventions suggested by Gane and Sarson.(1)

(iv) Study of the forms in use and important files maintained by the Clearing House and the kinds of operations (updating, searching, sorting, etc.) and the volume and frequency of such operations on the files.

(v) Study of microcomputer availability in Indonesia from trade literature received from manufacturer's representatives and from discussions held with a few representatives.

(vi) A sample study of the extent of coverage of relevant tropical biology literature by the Clearing House at BIOTROP in its manual files and in its current awareness services. The area chosen for the sample study was tropical aquatic weeds.

(vii) Interviews with a few scientists at BIOTROP to ascertain their reactions to existing services and to new services that may become available in the event of automation, and to the need for access to other national and international data bases and information sources.

(viii) Utilisation, direct and indirect, of the products and services of international data base services.

(ix) Discussions with INDOSAT, the quasi governmental Indonesian satellite telecommunication agency concerning access to data networks outside Indonesia.

---

(1) C.P.GANE, and T.SARSON. Structured systems analysis: tools and techniques. Englewood Cliffs, N.J.: Prentice Hall, 1979.

13. In analyzing existing functions, the effort has been to examine all factors that influence the effective performance of the function. By effective performance is meant the extent to which the commonly understood goals of a given function have been met. For instance, the commonly understood goals of the acquisitions function of a library is to ensure that publications of potential value to the organization are monitored, selected and acquired as quickly as possible.

14. In order to meet this goal, for instance, a library is provided a budget; it establishes several procedures (comprising operations and tasks); it allocates resources; it communicates with other libraries, publishers, users and vendors; and it exercises controls of different kinds (eg. budgetary, pre-evaluation of material to be acquired, vendor performance monitoring, etc.). Automation and utilization of the products of automated systems could increase the effectiveness with which a library can perform a given function under certain conditions and not in all situations. For instance, automation cannot help in a situation where the budget is a major constraining factor in the library achieving an effective performance of its acquisition function.

15. In the identification of potential areas for the application of microcomputers in different functional areas of the Clearing House, therefore, one criteria that has been applied is to examine whether automation can signficantly influence the effectiveness with which the Clearing House can perform a given function.

16. Other criteria applied in identifying potential areas for automation are as follows:

- whether the efficiency of existing procedures could be improved,

- whether professional manpower could be relieved of tasks which are considered clerical,

- whether the production of desireable new information products and services become possible which at present are not being produced due to limitations of one kind or another (eg. inadequate professional staff), and

- whether the quality of existing products and services can be improved.

17. The consultant has not taken the cost-benefit point of view in identifying potential areas for automation of functions in the Clearing House. It is difficult to justify automation in a developing country on the basis of costs alone. Further, the view has been taken that training and exposure of developing country library and

information professionals in the use of modern information technology tools such as microcomputers, has long range benefits which are not easily quantifiable. The one-time cost of a microcomputer system and the recurring costs of maintaining it are sufficiently low to justify its use in improving the quality of existing services, providing wider accessibility to information, and in the provision of new services not hitherto possible.

Library functions

18. The following library functions were analysed:

- Book acquisition
- Cataloguing
- Serials control
- Circulation
- Administration of exchanges with other centres

The Acquisitions function

19. The library materials budget (for book acquisition and periodical subscriptions) for 1984-85 is Rp.14,000,000, or approximately $14,000.00. The budget does not leave much scope for an acquisitions programme that is commensurate with the subject interests of BIOTROP. In fact this budget is just about enough to meet the costs of subscription to the 79 journal titles being paid for by the Clearing House and the Clearing House has even had to cancel subscriptions in 1983-84 to a few secondary journals (eg. Biological Abstracts, Current Contents) to cope with the increases in cost of subscriptions in recent years.

20. The main source of funds for the acquisition of books by the Clearing House is the grants it gets under the Netherlands Government Literature Programme every year. The grant is administered by the SEAMEO Secretariat at Bangkok, and is available to all SEAMEO Centres. In addition to the grants from the Netherlands Government, the Clearing House has also received grants, on occasion, from the British Council and the Asia Foundation.

21. In addition to books and other publications obtained under the different grants, the Clearing House receives a good portion of its accessions as donations from individuals or institutions within Indonesia and outside. During 1982-83 it received 30% of its accessions as gifts.

22. Books to be acquired under the Netherlands Government Literature Programme are listed and sent to the SEAMEO Secretariat once a year. The Secretariat consolidates requests from the different SEAMEO Centres and transmits the requests to the Government of the

Netherlands. Books on the list are then sent directly to the requesting institution by the Netherlands Government as and when they become available. Books requested under the Programme in 1981-82 are being received in 1984.

23. The data flow diagram of the acquisitions function at the Clearing House (Appendix II) is quite unlike flow diagrams for the acquisitions function in most special libraries. Further, the volume and frequency of transactions in the files maintained by the Acquisition Section of the library are so few in number that automation of the acquisition function at the present level of operations is not considered to be of high priority. This situation is unlikely to change in the next five years, as there is no signficant change in the projected expenditures for library materials in BIOTROP's third five-year development plan for the period 1983-84 to 1988-89.

24. All this is no reflection on the quality of acquisitions by the Clearing House. In fact the Clearing House Manager and Librarian monitor a variety of sources of information to select publications of potential value to BIOTROP. The desiderata, however, accumulate awaiting the availability of grants. This situation results in disadvantages, such as the following, which influence the effectiveness of the Clearing House.

- Books are received 2 to 4 years after publication. This delay in input of new books is considered unacceptable in many specialized institutions.

- Some titles (eg. conference publications) which are published in small quantities may never become available to BIOTROP simply because they are out-of-print by the time they are requested.

- The Clearing House is not in a position to develop and implement a predictable acquisitions' policy.

25. The above problems cannot, however, be alleviated by automation, but are nevertheless highlighted in this report in the interest of presenting as complete a picture of present operations as possible, and also so as to present constraints that limit the effectiveness of the Clearing House. Some constraints, eg., limited professional manpower, could be alleviated to some extent by automation, while others, such as an inadequate book budget cannot be improved by automation.

The cataloguing function

26. The card catalogue at BIOTROP, as in most developing country libraries, is the result of original classification and cataloguing by the library.

27. The data flow diagram of the existing cataloguing procedures is given in Appendix III and the folowing facts about the existing

procedure are noteworthy:

- The same record is keyboard thrice. Once to cut the stencil for the unit card; a second time to produce the monthly accession list which is distrubuted only to BIOTROP users, before the book is classifiedl; and for the third time to produce the half-yearly list of accessions which contains the classification numbers. The half-yearly list is circulated all over the region.

- The same record is proofread thrice. The proof reading is done by a professional librarian in the interest of error free and complete cataloguing.

- The time required to prepare and file catalogue cards for a book varies between 10 to 12 weeks after receipt of the book.

- Accession listing is done twice; once for the monthly list which is produced without waiting for the book to be classified, and a second time to produce the half-yearly accession list which is distrubuted to individuals and institutions all over southeast Asia.

28. Data pertaining to the major working files in the cataloguing function are given below:

Main entry manuscript file

Current size: About 60 5" x 3" cards

Rate of growth: Average of 10 to 12 cards per week

File operations: File gets purged when data on manuscript cards get transferred to stencils for production of unit cards

Projected increases: No significant change expected in the size, rate of growth

Unit cards file

Current size: 200 5" x 3" cards (for about 40 titles at an average of 5 cards for each book)

Rate of growth: 50 to 60 cards per week

File operations: Headings, one on each unit card are added by typing on the unit cards for each book catalogued, and the Unit cards with added headings after

proofreading are ready for filing in the library catalogue

Projected increases: No significant change expected in the rate of growth in the next 5 years

Library catalogue:

Current size: Approximately 45000 5" x 3" cards comprising author, title, classified, series, etc. entries

Rate of growth: 3000 cards per year or approximately 50 to 60 cards per week

File operations: Merging of new records in the different sequences, searching, and occasional listing of items from the catalogue in the form of a bibliography

Projected increases: No significant changes are expected in the rate of growth of the catalogue in the next 5 years, as there is no likelihood of significant change in the intake of publications

29. It would be distinctly advantageous for the cataloguing function at the Clearing House to be automated. The present procedures are inefficient in the use of professional and clerical manpower and result in inordinate delays in the final product (viz. catalogue cards) becoming part of the catalogue.

30. Further, as in many library automation projects, establishing good control over the cataloguing function and the catalogue through automation could well be the cornerstone of the successful implementation of automation in other functional areas of the library.

31. The possible objectives of a cataloguing system for the Clearing House, and the possible short-term and long-term benefits that can accrue to the Clearing House, are discussed in the next chapter on Specifications of Requirements.

Serials control

32. The Clearing House obtains 430 journal titles comprising 300 primary journals, 100 secondary journals, and 30 of a general nature. In addition it receives 113 newsletters and about 60 annual reports.

33. Of the 430 journal titles only 79 are paid for through subscriptions or membership of professional bodies. The rest of them

are received in exchange for BIOTROP's serial and non-serial publications.

34. Rules for the remittance of foreign exchange payments in BIOTROP (and possibly in Indonesia) do not permit advance payment for journal subscriptions. It is expected that vendors will pay for the subscriptions in advance and claim the amount only after the institution subscribing to the journal has received 6 to 9 months of issues. As a result of this, vendors levy service charges far in excess of similar charges in other countries, e.g. India. Further, it was observed that 1984 issues of quite a few of the 79 titles on subscription were not received at all even in July 1984. The possible reason is that vendors make late payment to publishers. Considering that the 79 journals are among the most important titles in the list of journals being received at BIOTROP, the late or irregular receipt of these titles, does tell on the effectiveness of the Clearing Houses services, e.g. its current awareness services and bibliography compilation work.

35. Eventhough automation of the serials control function cannot alleviate the situation in respect of advance payments, it is considered useful to automate serials control in the Clearing House. This is because tasks such as checking-in or registration, claiming of missing issues, preparation of binding lists, updating the holdings list of journals and other serials are almost entirely clerical once the basic information is captured. If this function is automated, more man-hours of professional and semi-professional time will become available for involvement in readers' services. At present, this work is being done by a semi-professional staff member. Software for the automation of serials control using microcomputers is now available even for small systems such as the TRS-80. Automation of the serials control function would enable also the periodic production of holdings lists of journals, which in a developing country is an important tool for the sharing of journal resources.

Exchange and mailing list maintenance

36. The Clearing House is responsible for ensuring that BIOTROP's research findings are disseminated as widely as possible in the region. As a result, the Clearing House maintains a list of 1605 addresses (970 overseas and 635 Indonesian) to whom BIOTROP's serial and selected non-serial publications are mailed. The BIOTROP Newsletter, a quarterly containing brief reports of BIOTROP's research findings, is distributed to all the 1605 addresses. Other serial publications such as the Annual Report and some of the Clearing House's publications, e.g. its Accession List, are sent to selected addresses. The serial and non-serial publications of BIOTROP, including that of the Clearing House, are used also to obtain on exchange, serial and non-serial publications from similar organizations in the region and outside, e.g. from CSIRO, Australia.

37. The maintenance of the Exchange and Mailing List and the production of address labels and form letters using a microcomputer is an application that will save the Clearing House considerable clerical

effort in manually adding new addresses, deleting, and amending addresses.

Circulation control

38. The volume of transactions at the circulation desk does not exceed 250 in a month. This includes the charging-discharging transactions, as well as inter-library loan transactions. The transactions on account of binding are quite insignificant at the Clearing House. The number of publications on loan at any given time does not exceed 600 to 800 items.

39. Automation of the circulation control function at the Clearing House is not considered to be a high priority application.

Documentation and information service functions

40. The major benefits of automation and the application of microcomputers are undoubtedly in the Clearing House's documentation and information retrieval functions. The existing procedures and the possibilities for applying microcomputers to these functions are discussed below.

Data base creation

41. The Clearing House maintains a 5" x 3" card file of references to journal articles, conference papers and monographic material considered to be of relevance of BIOTROP's professional programmes and research projects. Journals received at the Clearing House library are scanned by the staff of the Documentation and Scientific Information section (the Manager plus two staff members) and the bibliographical details of items considered relevant are transferred by typing on to index cards. The index cards and the journal are returned to the documentalist who then assigns index terms before returning the journals to the shelves. The cards are then held in suspense until it is time to produce the Monthly List of Indexed Articles (LIA). The LIA is stencilled, proofread, duplicated, and distributed to 225 addresses in the region. The index cards are then once again returned to the typist who produces as many copies of the card as the number of index terms assigned to that item. The card sets are then returned to the documentalist who then proofreads the cards, and files the cards in the card index file. One card is filed under each of the index terms.

42. The data flow diagram of the existing procedure to produce the LIA and to maintain the Card File is shown in Appendix IV.

2x

43. Data pertaining to volume of operations and file sizes in creating and maintaining the card index, and in producing the List of Indexed Articles, is given below:

Number of journals scanned for input	: 300 primary journals. Secondary sources are not scanned
Other sources used for inputs	: 40 internal publications (unpublished reports, conference papers)
Average number of items input per year	: 2500 items
Data elements	: Bibliographical citation without abstracts
Average size of each record	: 300 characters
Average number of index terms per record	: 4 controlled terms per item
Free indexing, if any	: No defined policy
Current size of card index	: Approximately 45000 cards for 12000 items
Rate of growth of file	: 8000 to 10000 cards per year for 2500 items
Method of recording	: Typewriting. Each item is typed as many times as the number of index terms assigned to that item
File organization	: Alphabetical. Multiple entries for each item. One entry is filed under each index term assigned to the item
File operations	: Merging of cards in file. Searching
By-products	: Monthly List of Indexed Articles typed, stencilled and duplicated

44. The Clearing House card file is used for on-demand searches and for the compilation of bibliographies as support to training courses conducted at BIOTROP. The Clearing House receives an average of 20 to 25 search requests in a year, and 6 to 8 bibliographies are compiles each year as training course support material.

45. A sample study of the extent of useful literature on tropical aquatic weed biology actually covered by the Clearing House's card index, and list of indexed articles, was done. Articles on tropical aquatic weeds appearing in the Weed Abstracts during the years 1981 to 1983 were listed out, and these were searched for in the card index as well as in those issues of the list of indexed articles for which cards had not yet been filed in the card index. The table below summarizes the results:

Year	No. of Abstracts seen in Weed Abstracts	No. of Abstracts available in Card Index and LIA	No. of items in the Card Index but not found in Weed Abstracts
1981	137	14 (10.21%)	29
1982	156	40 (25.64%)	64
1983	78	21 (26.92%)	37
Total	371	75 (20.21%)	

46. In order to determine the extent of the usefulness or relevance to BIOTROP of the literature not covered by the card index and LIA, a random sample of 48 items out of the 296 items (371-75) not indexed by the Clearing House was selected using a Random Number Table. The 48 items were divided into 2 sets of 24 items each. The sets, one each, were given to 2 scientists who were asked to evaluate the relevance of these items to BIOTROP's research interests on a 3-point scale, viz. Highly Relevant, Relevant and Not Relevant. The results of the evaluation by the 2 scientists were as follows:

Highly Relevant	9 items
Relevant	35 items
Not Relevant	4 items
Total	48 items

47. The results indicate that the Clearing House is possibly missing a significant portion of the useful literature in the area of tropical aquatic weeds in its data base. The result also indicates that some literature input by the clearing House is not abstracted by Weed Abstracts, which is considered to be international in its coverage. It was found that the items not covered by Weed Abstracts were from Indonesian and other S.E.Asian journals and items generated within BIOTROP such as its conference papers, research reports and other non-conventional literature.

48. The results, although arising out of a limited study, are not surprising, considering the fact that the input to the Clearing House's data base is predominantly from the journals received at the Clearing House.

49. There are at least two indicators, however, to show that the LIA, inspite of the possibility that it may be missing useful tropical biology literature, is serving a useful purpose. The first is the opinion of the scientists at BIOTROP who consider that the LIA enables them to keep track of recent literature in their areas of interest. The second indicator is the request for copies of articles indexed in the LIA received by the Clearing House from recipients of the LIA all over S.E.Asia and other parts of the world. There is no doubt that recipients working in field stations far away from libraries do find the LIA and the back-up services of the Clearing House useful.

50. In its present form the LIA is a list of bibliographical citations without abstracts, organized alphabetically by broad subject classes, reflecting the interests of all the three professional programmes at BIOTROP. A typical issue, for instance, featured the articles under the following headings: Agroforestry, Allelopathy, Coral Reefs, Deforestation, Fish Biology, Fish Culture, Forest Ecology, Fungicides, Mangroves, National Parks, Pest Control, and Water Quality. It can be seen that the range of subjects indexed in the LIA is quite wide.

51. There is every reason to believe that the LIA's usefulness can be greatly increased by: (i) increasing its coverage, (ii) by the inclusion of abstracts, and (iii) possibly producing it as more than one current awareness bulletin in more specific areas of tropical biology (e.g. Agroforestry, Aquatic Weeds, Insect Pests, etc.) rather than in its present form of putting all the information in one bulletin. This view was also held by the scientists who were interviewed during the study.

52. Considering also that research work at BIOTROP is project or mission oriented, the provision of SDI from a data base that covers the subjects of BIOTROP's interest relatively comprehensively is strongly recommended. Such an SDI service could, in fact, be extended not only to users at BIOTROP but also to other scientists interested in and working on tropical biological and related areas within the S.E.Asian region.

53. The Manager of the Clearing House had sent out a circular to all the professional programmes explaining the concept of SDI and asking whether scientists would find such a service useful. The response of the scientists was enthusiastic with more than 20 scientists, mostly project leaders, expressing their interest in receiving such a service. This view of the scientists was confirmed also in the interviews held during this study.

54. The SDI service and the conventional current awareness documentation bulletins in specific areas of tropical biology, retrospective on-demand search services, and bibliographies compiled as support to training programmes may together be considered as a package of services that the Clearing House should provide not only to users at BIOTROP but to others in the region.

55. However, the Clearing House's present intake of journals and its staff strength in the Scientific Information Section (2 full-time

professionals including the Manager and one part-time staff) is not adequate to enable it to improve its coverage of literature, provide SDI and other retrieval services.

56. The use of a microcomputer and access to relevant downloaded sections of an international data base such as the AGRIS offers promise as a method for the Clearing House to provide SDI and retrospective search services to its clientele. It is considered necessary for the Clearing House to think of a highly selective data base as its central information product, and around which its current awareness and retrieval services should be built.

57. Alternatives available to the Clearing House for the application of a microcomputer in creating its data base, and for the provision of SDI and other current awareness and retrieval services, are described in the next chapter.

Thesaurus development

58. The Clearing House has been working for little over a year on the development of a thesaurus suitable to its needs. It was found that the AGROVOC did not meet the Clearing House's requirements adequately enough. This is not surprising considering that AGROVOC is oriented to agricultural sciences. There is no doubt however, that literature in some areas of interest to BIOTROP (e.g. Agricultural Pests, Forestry) could be indexed adequately using the AGROVOC. There is need, however, for terms at a higher level of specificity than what is presently available in the AGROVOC for some areas of interest to BIOTROP.

59. The Clearing House may find it advantageous in the long run to consider its Thesaurus development activity as more in the nature of developing a microthesaurus to AGROVOC. This would enable the Clearing House to concentrate on term collection, collation and structuring in areas where AGROVOC is inadequate, accepting in other areas the terminology and structure of AGROVOC. The microthesaurus would need to be compatible with AGROVOC at the highest hierarchical level.

60. The use of a microcomputer for the creation, maintenance, and output of the microthesaurus for BIOTROP is an attractive and feasible application. The requirements of a microcomputer based system for thesaurus development and the possible benefits are discussed in the next chapter.

On-going research information system

61. The Clearing House is responsible for the maintenance of data pertaining to the progress of research projects at BIOTROP and for the dissemination of information on on-going research.

62. Each research project leader is expected to fill up a data sheet pertaining to his project once every quarter. The data sheet

(Appendix V) contains information on the title, duration and objectives of the project, data on field trips undertaken as part of the project, and publications arising out of the project during the quarter for which the report is being filed. In addition the project leader is expected to give a brief narrative description of progress made.

63. The progress report is sent to the Deputy Director who uses it to monitor the technical progress in the project. The report is then sent to the Clearing House. At present the Clearing House publishes the narrative in the progress report data sheet in the BIOTROP Newsletter which contains, among other things, information on research-in-progress. The data sheet is then filed for archival purposes in the Clearing House.

64. Only limited use is made of the data at present. It is possible, however, to store the data as a computer-readable file. A system could be thought of to search the file by several parameters, e.g. subject, geographical area, project personnel, professional programme, etc. The file could be searched, for instance, before a new project proposal is made to retrieve or display information on previous project. The system could also alert the management or project leaders in advance of project completion dates, and also alert project leaders to file their progress reports and project completion reports.

Publications function

65. The publication section of the Clearing House is responsible for the editing and production of the BIOTROP Newsletter (quarterly), the BIOTROP bulletins (an adhoc numbered series), the BIOTROP special publications, usually proceedings of workshops and conferences held at BIOTROP or sponsored by BIOTROP, and the Annual Report. The section is also responsible for the editing of research papers submitted by the BIOTROP scientists to journals and conferences.

66. All the above publications are off loaded to private printers either at Bogor or at Jakarta since BIOTROP does not have printing facilities of its own.

67. The clerical effort (typing, proof-reading) and the fact that a lot of commuting is involved in delivering, typescripts and proof-read galleys to printers contribute to delays in the production and availability of publications. The publications section is staffed by two persons including the Publications Officer. The staffing is hardly adequate to cope with the volume of publications required to be handled by the Publications Section.

68. It would be distinctly advantageous for the Publications Section to have access to Word Processing and small offset reproduction equipment. The publications which do not contain halftone plates could be composed and printed in-house if the Clering House had access to Word Processing and small offset printing facilities. Such access would enable a considerable portion of the work load of the Publications Section to be handled with in-house facilities. The

saving in cost of publications and the speed with which publications can be brought out will more than justify investment in the equipment.

69. BIOTROP already has a GEHA 2000 offset duplicator. It is considered useful for BIOTROP to acquire a paper master making photocopier. Many of the presently letter-press-printed publications could be composed, edited and output using a wordprocessing package. A good letter quality printer capable of using a variety of type faces on the microcomputer proposed for the Clearing House would enable the production of good copy which could later be transferred to a paper master which in turn could be used on the GEHA 2000 to produce upto 1000 copies from a paper master.

70. All the publications of the Clearing House could also be produced using offset reproduction rather than stencil duplication. This would greatly improve the presentation of the Clearing House's publications.

71. The previous chapter identified the potential areas for automation and briefly justified the application of microcomputers in areas considered good candidates for automation.

72. This chapter attempts to delineate the requirements that each of the systems proposed to be automated should satisfy.

73. The Specifications of Requirements included in this chapter provide a description of the proposed systems in such a way that all people involved in the development of the system (librarian, managers, programmers) can understand what is to be achieved by the system. Further, it is hoped that the specifications will provide a foundation on which system development can be based.

74. In drawing up the Specifications of Requirements for the different systems it is assumed that all of them will be microcomputer based.

75. The specifications attempted in this report will comprise the following components:

(i) Delimiting factors or constraints made on the development of the system, if any or assumptions mace regarding the proposed system, if any.

(ii) A general level description of the proposed system containing an overview of the functions to be performed by the system.

(iii) A description of the outputs of the system.

(iv) A description of the sources of data to be used in the system.

(v) System flow diagram wherever necessary.

76. In drawing up the requirements specifications, discussions with the Clearing House staff, observation of procedures, study of existing products and services, the potential for new products and services, and the expectations of end users has been taken into account. The existence of similar microcomputer based systems has also been considered. The limitations of microcomputers, mainly in their ability to store large volumes of data has been considered.

The cataloguing system

77. It is assumed that the card catalogue will continue to be used by the library as the output product even after the proposed cataloguing system is designed and implemented.

78. The system will be menu-driven and provide the following functions:

- Entry of new cataloguing data
- Production of proof copy of input cataloguing data
- Amendment of records in the cataloguing data file
- Production of ready-to-file catalogue cards
- Production of hard copy of accessions list
- Archiving of cataloguing data

79. The system will generate user-friendly screens for the different functions and prompt data entry operators for input of various data fields. The data entry module will make consistency checks (eg. presence of mandatory fields, check digit validation of input ISBN, etc.). The data entry module will permit retracing of steps in order to examine and/or correct a field already input. The module will permit the skipping of fields for which there is no input data. The data for the tracings fields will be generated from input data and need not be explicitly input by the data entry operator.

80. The catalogue data file created by the data entry module will be randomly accessible to the module for making amendments.

81. A monthly cycle of operations is envisaged. Cataloguing data for publications received in a given month will constitute the current catalogue data file. The module for the production of catalogue cards can be invoked at any time during the month. It will ensure that catalogue cards once produced for a given record will not be produced again for the same record. The hard copy of the accessions list will be produced at the end of the month after which the catalogue data file will be cumulated and archived in a communications compatible format (eg. UNIMARC, UNISIST Reference Manual) for possible later use in a system for interactive access to the catalogue and for possible exchange with other institutions.

82. The system will also ensure that in addition to capturing bibliogrpahic data, it will also capture subject information in the form of keywords or descriptors and identifiers in addition to class numbers so as to permit information retrieval and interactive subject access to the catalogue at a later date.

83. It is feasible to think of converting the existing catalogue (for about 10000 publications) into machine readable form. The disk storage required to store the present catalogue at 500 bytes per record would be 5 Mb (500 x 10000). The rate of growth of the catalogue file at the present level of intake is about 0.4 Mb per year (900 x 500). About 10 Mb of hard disk storage would be adequate to store the present catalogue plus the additions that will be made during the next 5 to 6 years at the present level of intake. Some disk space (approx one third of the total size) is required to store

the indexes needed for efficient interactive access.

84. Retrospective conversion of the existing catalogue is not advised in the first instance without ensuring the possibility of regularly making a back-up copy of the catalogue file and indexes. A microcomputer system with a tape or catridge drive would be required to enable the making of a back-up copy of the catalogue file resident on hard disk. Access to a mini or main frame computer and the use of the Clearing House's microcomputer as a front-end with the possibility of file transfers between the microcomputer and the host computer would also enable consideration of retrospective conversion of the catalogue and its use in an on-line fashion.

Outputs

85. The following outputs will be produced by the system:

- Catalogue cards in a ready-to-file form. The cards output will not simply be unit cards only but will be full-fledged entries of different kinds such as Main Entry, Series Entry, Class Number Entry, etc.

  The system will also provide for pre-sorting the cards to be filed in the alphabetical part of the catalogue and for those in the classified part of the catalogue.

- Hard copy for the production of an accessions list for accessions made during a specified period. The hard copy will be organised by class number or by broad subject groups and will be formatted so as to be ready for photo-offset plate making.

- Archive File in a communications compatible format such as UNIMARC or the UNISIST Reference Manual or the Common Communications Format. The Archive file will cumulate the monthly files and will be stored on diskettes with appropriate header information.

86. The printed outputs will be produced on a letter quality printer capable of printing in upper and lower case letters.

Sources of data

87. The primary data source will be a cataloguing worksheet which will be filled in by a professional librarian. The worksheet will need to be designed to provide for field tags and subfield codes that will be required to create the archive file in the communications compatible format. The tags and subfield codes are input by the data entry operator as part of the data stream of different fields. It will be the responsibility of the processing programs to recognise the presence of the tags and subfield codes. They will be ignored in programs to produce the catalogue cards and hard copy of the accessions list and made use of in creating the archive file.

88. The System Flow Chart of the proposed cataloguing system is given in Appendix-VI.

Benefits envisaged

89. The proposed system will eliminate the need for multiple keyboarding to produce catalogue entries and a product such as the Accessions List. A single initial keyboarding effort at the data-entry stage and limited keyboarding of specific fields in the amendment operation would capture cataloguing data required for different end uses. As a result, it is expected that catalogue cards and the Accessions List will be produced without the delays that are inevitable in entirely manual systems.

90. The proposed system will relieve the professional librarian from multiple proof reading of the same record output in different products. As a result it is expected that more professional manhours will become available for work involved in cataloguing such as descriptive cataloguing, creation and maintenance of authority files, classification and subject cataloguing.

91. A long-term benefit of the proposed system will be the possibility that at some future date the cataloguing data captured in machine-readable form will become available for interactive access on a mini or main frame computer. Such a possibility is not ruled out considering that the Bogor area already has systems such as the IBM 4331 system at the Institute of Agronomic Research of the Ministry of Agriculture. This system has 2 Mb of core memory with 2 disk drives of 600 Mb each and 2 tape drives. The system can support several terminals. The Institute was willing to consider the possibility of providing a terminal to BIOTROP which is about 8 kilometers away from the Institute. If such access becomes available there is no reason why the Clearing House's microcomputer cannot be thought of as a front end to a larger system such as the IBM 4331 for the purpose of storage, and retrieval of large volumes of information.

92. As already pointed out, it is also possible to use the hard disk on a microcomputer to store the catalogue. The capture of cataloguing data in machine-readable form would provide the Clearing House with the option to convert its card catalogue into an on-line catalogue in the future.

The serials control system

93. The serials control system will be menu-driven and will provide the following options:

- Data entry to create master serials data file records
- Checking-in of periodicals issues
- Claiming of overdue issues

- Updating of holdings lists

- Preparation of lists of titles ready for binding

- Printing of holding lists

- Printing of vendor-wise lists of titles for the purpose of renewal of subscription

- Alerting library management about renewals

- Printing of list of currently received journals

- Budgeting and expenditure reporting

94. The checking-in module will permit access to the serials control data file preferably by ISSN or by a control no. assigned to each title. The screen display of a record for any title in the serials control data file invoked by the checking-in module will contain the title, periodicity, ISSN, current volume number, number of issues per volume, all previous issues of the volume received and dates on which received, status of the index to each volume (i.e. whether index published or not, if so how, e.g. as part of last issue, as a separate, etc.) name or code of vendor, period of subscription, data on how received (subscription, gift, exchange), date on which subscription expires, invoice number, subscription amount paid and details of payment. The cursor will point to issue that is expected to be received but provide the capability to enter data pertaining to any other issue.

95. The checking-in module calculates the expected date of receipt of the next issue as a function of the date of receipt of last issue plus periodicity expressed in days and a claim delay tolerance factor which is dependent upon the periodicity but could be made to take a specific value (e.g. when the publisher makes an announcement that a certain issue or issues will be delayed due to some reason). The expected date of receipt of the next issue is used by the claims module to print claim notices.

96. A different type of claim notice as compared to those for paid subscriptions is required for the serials which are received in exchange. This is particularly so in the case of the Clearing House at BIOTROP which gets a substantial portion of its journals in exchange for its serial and non-serial publications. The claim notice for journals received in exchange will include information on what items are in fact sent on exchange by the Clearing House.

97. The data on holdings is held as a separate subfile linked to the master serials data file by the ISSN or control no. given to the title. When there is a change in the holdings of a particular title (e.g. new back volumes added or title no longer being received or title has ceased publication) it will be possible to invoke the module to update holdings data and using the ISSN or control no. to access the actual data and amend it suitably.

98. The module to prepare lists of titles ready for binding will check whether a given volume is complete including the receipt of the index. Once the volume is returned after binding this information is incorporated in the master serials data file using the checking-in module. This would ensure that this title is not included in the binding list in the next iteration.

99. Outputs of the system

(i) Master Serials Data file which is envisaged as a fixed length record file containing data elements described above. This file is created ab-initio using the data entry module. This file will be indexed by the ISSN and by the Control No. given to that title. Once a record is created in the Master Serials Data file it is accessible to other modules. Each record in this file will occupy 500 bytes and a 400 Kb diskette should be adequate to hold the file and indexes.

(ii) Overdue claim notices of three kinds for items on subscription, items received in exchange and for those received gratis.

(iii) Binding lists

(iv) Holdings list. This would be prepared possibly once a year or when many changes have taken place in holding information (e.g. addition of several new titles, deletion of titles, etc.). The output of the hard copy of the holdings list will be in a form ready for offset plate making.

(v) Vendor-wise lists

(v) List of currently received journals

Sources of data

100. The data to be input to the data-entry module will come primarily from the existing Kardex System being used by the Clearing House. Holdings data will need to be keyed in using the serials catalogue. Data pertaining to items sent by the Clearing House in exchange for a serial will need to be input from the files maintained by the periodicals section of the library.

The mailing and exchange list system

102. This application will be a relatively straight forward application that can be handled completely independently by clerical personnel. The system will provide the folowing menu of options:

- Add a new address to the file

- Delete an address from the file

- Search the file

- Print the total mailing list

- Print mailing list for a given publication

- Amend an address in file

- Print mailing list by country

- Print list of institutions on the exchange list

103. The address master file will contain the following data elements; name of person in case of individual, designation, address, address code, whether on free mailing list or on exchange list, country code, codes for each of the serial publications to be mailed to the address.

104. The file will be indexed by name, publication codes, country, code for institution on exchange, and a code for organization. It will be possible to search the address master file by name or by institution.

105. The chief outputs of the system will be address labels for mailing a given publication, a total mailing list or countrywise mailing list, and a list of institutions on the exchange list.

106. No special programming effort to implement the Mailing and Exchange List is envisaged. It is recommended that a Mailing List management package available on most microcomputers with a CP/M operating system should be adequate to create the file, search it and provide the outputs required.

Data base creation, SDI and current awareness system

107. The Clearing House clearly has a regional responsibility, and even though it is not explicity stated, a legitimate objective of the Clearing House should be to create and maintain a bibliographic data base relevant to the mandate of BIOTROP--to its present and its probable future interests. The data base may be considered to be the central product of the Clearing House with the SDI, current awareness and retrospective search services being built around the availability of a data base. The desirability of such an objective was discussed with the Manager and staff of the Clearing House and with the Director of BIOTROP. The consensus of the opinion was that the Clearing House had both the mandate and the potential for the creation and maintenance of a data base in selected areas of tropical biology relevant to the programmes at BIOTROP and interests in the region.

108. The alternatives available to the Clearing House in creating a data base relevant to the interests of BIOTROP and that of the region in areas of tropical biology are:

(i) To provide the input to the data base using entirely in-house effort. In this alternative the Clearing House staff will need to scan primary and secondary literature, identify potentially useful pieces of information, abstract and index those items, and then establish procedures to capture the information in machine-readable form.

(ii) To obtain from existing computer-readable data bases, in machine-readable form, records of those portions or sections of the data bases that are relevant to BIOTROP's interest and then to add to these extracted records, those generated within BIOTROP or in the region and from sources not covered by the data bases. International data bases that would cover BIOTROP's areas of interest quite comprehensively are the AGRIS, CAB, BIOSIS, and AGRICOLA.

109. The Clearing House has been using the first alternative in building its card index although at present the input to its card index is only from primary sources being received at the Clearing House. As was seen earlier this could lead to the missing of a sizeable portion of potentially useful information from the Clearing House's data base. The present staffing of the Clearing House and projected increases will not provide the Clearing House the required manpower to significantly improve the coverage in its data base.

110. The second alternative, on the other hand, is becoming increasingly feasible for specialized information centers such as the Clearing House. This is because some data base producers are already offering to customer's portions or sections of their data base on diskettes. The customer provides the data base producer, a profile which is used to extract the records from the data base. The tapes or diskettes are then available for use on the customers computer for further processing.

111. The BIOSIS (Biosciences Information Service) is already offering such a service known as the B-I-T-S (Biological Information Transfer System). The BITS output is available on diskettes suitable for a wide range of microcomputers. The Biosis also offers a software package called BIOSUPERFILE that will search the BIOSIS diskettes and provide various outputs.

112. The AGRIS is also considering the possibility of providing to developing country institutions extracts of the AGRIS data base on diskettes.(1) Indications are that downloading to diskettes by data base producers may become more and more common in the years to come.

113. Several advantages are seen in obtaining relevant extracts of a data base such as AGRIS. These are:

- The coverage of such a file will be much larger than

---

(1) H.SCHNID, V.DRAGULEV, and A.LEBOWITZ. "Present and future application of micro-computers for the AGRIS and INIS information systems". In Application of Mini- and Microcomputers in Information, Documentation and Libraries (eds. C.Keren, and L.Perlmutter). Amsterdam, North Holland, 1983.

what the Clearing House on its own can achieve

- The file will already be in machine-readable form and as such ready for further processing to provide an SDI service, and current awareness bulletins

- Some of the items in the file would have abstracts and the output of such items in various information products and services would improve the quality of the products and services

114. If the Clearing House could obtain access to relevant extracts of a data base such as AGRIS, it could add value to the extracted file in the following ways:

(i) It could augment the indexing of the items in the extracted file. By augmenting is meant indexing the items more exhaustively and at a higher level of specificity, and where necessary slanting the indexing.

(ii) It could add to the extracted file, records for items generated within BIOTROP and within the region and from sources not covered by the data base, e.g. AGRIS.

115. The above mentioned operations will add significantly to the value of the product derived from an international data base. The resulting product may be thought of as an independent product in its own right in the sense that it is more selective and carefully oriented to a well-defined class of users than the product from which it is derived.

116. This alternative offers so many advantages for the provision of high quality information services that it is strongly recommended that the Clearing House should explore the possibility of obtaining relevant extracts of the AGRIS data base. The AGRIS coordinating centre in Rome and the Asian Information Bank for Agriculture (AIBA) in the Philippines may be approached to find out the possibility of obtaining on diskettes those portions or sections of AGRIS which are relevant to BIOTROP's professional programmes and to other interests in tropical biology in the region.

117. The provision of information services using a subset of an international data base such as AGRIS, augmented with local input and indexed in depth, may be considered to be a long term goal of the Clearing House. A feasibility study of such use of a subset of AGRIS for a microcomputer based storage, retrieval and dissemination system is recommended. The feasibility study may examine the extent of coverage by AGRIS of useful literature to BIOTROP, the volume of data that will need to be extracted, the kind of file structure that the extracted data may take, and the hardware and software requirements to enable microcomputer processing.

118. It may even be worthwhile to fund a limited project at BIOTROP to use the BITS diskettes in a very specific are, e.g. Tropical Weeds and their control. The diskettes could be used to provide an SDI

service to carefully selected clientele in the region. The project would enable the Clearing House staff to get the experience and confidence in handling downloaded diskettes.

119. BIOSIS charges an average of $0.30 for every item output to diskettes in the BITS service. It is estimated that the relevant output from the BIOSIS data base in the area of Tropical Weeds and Weed Control will be around 1400 items per year. The cost of the output would thus be $420.00 per year. To this is to be added the cost of the BIOSUPERFILE package and cost of diskettes supplied by BIOSIS. The total cost of obtaining downloaded data and the capability to handle this data would be $600.00 per annum. This is a tenth of the cost of the annual subscription to the Biological Abstracts.

120. The IDRC was considering the funding of a specialized information centre on weeds at BIOTROP. The nature of the funding and objectives of the project were still to be worked out at the time of the Consultant Mission. The Clearing House may consider asking IDRC for funds and expertise in utilising data downloaded from AGRIS or BIOSIS in the provision of SDI and current awareness and retrieval services to the region.

121. In the short term, however, the existing operations leading to the creation of the data base and its use in generating the current awareness bulletins could be automated. One of the important by products of creating the data base in machine readable form would be an SDI service tailored to meet individual needs of scientists not only at BIOTROP but elsewhere in the region. The requirements of such a system are described below.

General description of the system

122. The system will enable the following functions:

- interactive data base creation and maintenance
- interactive creation and maintenance of an SDI users profile file
- batch processed SDI searching and provision of SDI outputs
- production of hard copy for one or more current awareness lists
- archiving of the bibliographic data base for future use in retrospective searching
- interactive searching of the cumulated data base

123. The data entry module will provide for the creation of an input screen designed to facilitate interactive data entry. It will validate data elements and make consistency checks based on defined

criteria. The module will also permit random access to a record from a control number for the purposes of carrying out corrections.

124. The system will allow any of the data elements input to be defined as index keys to be used by the retrieval and SDI modules. The system will permit repeating fields (e.g. several authors) with each value of the field capable of being an index key. Each data element input is permitted to be of variable length even though the physical record may be of fixed length.

125. The module to interactively create an SDI profile will generate another input screen to enable the input or modification of user profile information. The user profiles in the system will comprise the name and address of the recepient and search elements comprising descriptors or other elements (e.g. authors, ISSN, identifiers), and a search expression in Boolean logical form using set numbers for the different search elements in a given profile. This module will enable modification of any profile interactively. Such modification will be required when the profile is to be changed in response to changed requirements of a given user or when the feedback from the user suggests the need for modifications in the profile.

126. The module to produce SDI outputs will be invoked periodically, e.g. once a month, to search the current month's input of bibliographic data against stored profiles to produce SDI outputs. The SDI search module will permit truncated term searching of all index keys. The module will also keep statistics of SDI provision.

127. Each record entered into the data base will be given a broad group code to represent a fascicule (e.g. fascicule on Agroforestry, Aquatic Biology, etc.) to enable the sorting of the current month's records by group code. The file will be used to produce fascicules in well-defined areas of interest of BIOTROP. The system will ensure that outputs to the letter quality printer are ready for offset master making.

128. Archiving of the current input is envisaged as appending of the current input to the previous volumes of the data base and will be done after the SDI outputs for a given month and the current awareness fascicules for the month are produced. The file structure for the cumulated file will be directory oriented. The module will also merge the indexes to the previous volume to those of the current input. The cumulated file is thus available for interactive searching. It is also envisaged that the cumulated file will be stored in a communications compatible format for possible exchange with other organizations in the region.

129. The interactive search module will enable the search of the cumulated file using a simple query language which will permit a step-by-step approach to query formulation through appropriate responses by the system to each step. It will be possible, for instance, for a searcher to see on the visual display unit some or all of the items retrieved in a given search step. The system will permit the use of Boolean logical expressions and truncated term searching. This module will also permit the output to the line printer, the

records of any given set. This would enable the Clearing House to respond quickly to information searches and for the production of bibliographies.

130. Outputs

- A temporary file generated by the data entry module. This file is accessible randomly for the purposes of making corrections

- The search-ready file which is generated by a sub-function within the data entry module. The sub-function would generate the indexes to the bibliographic file to be used by the SDI module. The search-ready file is created only after ensuring that the current input is error free

- SDI profiles file. This file is envisaged as consisting of fixed length records accessible randomly to enable modification or amendment of any profile

- SDI outputs. The outputs will include bibliographical details of the items output, the abstract if any, and descriptors assigned to the given item. In addition it will also output the search element(s) which caused the item to be output. This would facilitate analysis of feedback from SDI recepients

- Hard copy of fascicules of current awareness lists in well-defined areas of tropical biology. The Hard copy will be formatted so as to be ready for offset master making. The offset printed current awareness publications are considered to be an alternative medium to the SDI for the provision of current awareness to users all over the region

- Search outputs resulting out of the interactive searching of the cumulated file. The outputs would be the responses to information requests and for the production of bibliographies

131. Sources of data:

- A photocopy of the first page of a given bibliographic item (e.g. journal article) with information added by indexers/abstractors will be the data source to be used by the data entry operator. Indexers will fill in details which are not available on the first page. For instance the indexers may add inclusive paginaation. Also indexers may mark portions of the authors abstract or text which may be input as an annotation or abstract of the item. Indexers will of course need to be provide the controlled index terms, free index terms and

identifiers to be input.

132. Indexers will use the AGROVOC and terms from the thesaurus being developed by the Clearing House to index the items being input. The depth of indexing in the present manual system is inadequate. A higher level of exhaustivity in indexing would be required for the automated system.

133. Benefits envisaged:

- One keyboarding operation for the input of bibliographical data, abstracts and index terms will enable the production of the machine-readable file, the SDI and fascicules of current awareness bulletins

- The system will relieve professional staff from repeated performance of non-professional tasks, proofreading the same record more than once and filing of cards in the Card Index

- The system will enable the provision of an SDI service in the true sense of the term (not as it is practised in many developing country institutions where even a current awareness list is designated as SDI)

- The capture of the data in machine-readable form will enable such data to be cumulated and permit its use for retrospective searching to meet expressed needs, and for the compilation of bibliographies

- The system will greatly increase the capabilities of the Clearing House to respond to information requests of different kinds through increased flexibility and versatality of its interactive search system

134. The System Flow Chart of the proposed system for data base creation and SDI provision is given in Appendix VII.

The thesaurus development system

135. The Clearing House's thesaurus is envisaged as a microthesaurus to AGROVOC. The thesaurus will therefore be used in association with AGROVOC. The term networks in the Clearing House's thesaurus will largely be for those concepts which require to be represented more specifically than provided for in the AGROVOC. Wherever a given term and its network in the AGROVOC are considered to be adequate, this fact will be indicated in the Clearing House's thesaurus and the network will not be repeated in full in the Clearing House's thesaurus. Such a step would enable the building up of the Clearing House's thesaurus without duplicating the terminology and structure of terms in the AGROVOC.

136. The system will provide the following options:

- Entry of a lead term and its network, i.e., other terms and their relationships with the input lead term

- Amendment of term and term relationships

- Search of a term and display of relationships with other terms

- Outputs to line printers of the thesaurus

137. When the option to enter a new lead term and its network of relationships is invoked, the system will first check to see if the lead term already exists in the thesaurus. If the term does exist, it will be displayed along with other terms to which it is related in different ways. The documentalist may then enter only those terms and relationships which are not already present (as seen in the display). When this is done the system updates the network of terms and generates all the new inverse entries required. In doing this the new inverse entries may be required to be merged with existing entries. The system will ensure that this happens.

138. It would be possible to amend (add, correct or delete) an existing term and/or its relationships with one or more terms already in the thesaurus. As a logical follow-up to amendments made to a term, the appropriate corrective action is taken by the system in amending other portions of the thesaurus where the same term appears.

139. It would possible to search for the presence of a term in the thesaurus and see a display of the complete entry on the screen.

140. The option to output the thesaurus to the line printer so as to enable it to be made available to indexers who will still need to use a hard copy version of the thesaurus in their indexing work.

141. Outputs of the system:

- Thesaurus Entry File. This would contain records, one for each lead term containing also the other terms related to the lead term and the nature of the relationships between the terms and the lead term. This file will provide indexed access by lead term.

  This file would be the master file of the system and would be accessible to the modules for amending the thesaurus entries and output of the thesaurus to the line printer. Each record in this file will be variable in length.

- Hard copy of the machine-held thesaurus. This would need to produced periodically to reflect additions, deletions and amendments made to the thesaurus.

Sources of data

142. The main source of data will be the thesaurus term forms being already in use by the Clearing House. The AGROVOC would also be a source of data.

143. Benefits envisaged:

- The system will relieve the professional documentalist from the clerical tasks such as filing of thesaurus term cards, from entering the same term in more than one form.

- The system will also ensure that errors inevitable in purely manual systems will be avoided because of built-in checks to avoid duplication and for the automatic generation of inverse entries.

- The system will make the thesaurus available in machine readable form enabling at a later date to make it available in an on-line mode to indexers, authors, and editors at BIOTROP.

HARDWARE AND SOFTWARE CONSIDERATIONS

144. The previous chapter discussed at some length the desirable features or requirements that automated systems in the Clearing House should satisfy.

145. In this chapter the hardware required to implement automated systems in the Clearing House is considered. The possibility of automating other functional areas in the near term (3 to 5 years) has also been taken into account in delineating the hardware required. Microcomputer availability in Indonesia--i.e., those systems sold, serviced and supported in Indonesia--as seen from trade literature and from discussions with a few representatives of manufacturers is presented. Software necessary to implement the automated systems is considered and the costs of providing a minimum microcomputer configuration with hard disk and associated system and utility software is estimated.

Hardware considerations

146. In order to implement the different systems presently proposed to be automated and for possible future applications, the microcomputer system for the Clearing House should fulfill the following conditions:

- The processor should be based on 16 bit architecture with a minimum RAM of 256K bytes. Expandability of the RAM to 512K bytes is considered desirable.

- The microcomputer should support hard disk storage of atleast 10 Mb in addition to floppy disk storage of upto 1 Mb. It is considered desireable that the system should have 2 floppy disk drives.

- Well known single-user (or multi-user) operating systems for microcomputers such as CP/M-86, MS-DOS or UNIX should be available on the system.

- It should be capable of emulating the terminals of well known mini or mainframe computers and through communication protocols and software it should be able to participate in file transfers to and from well known mini or mainframe systems.

- It should support protocols for access to data networks outside Indonesia.

- It should be possible to expand the system with more units of the same processor or with other processors into a Local Area Network for possible

distributed processing at some later date.

- The possibility of adding a tape or cartridge drive at a later date would be a desirable feature.

147. A 16-bit processor is suggested since this will enable memory expansion and greater addressability than 8 bit machines. A larger RAM would be advantageous in implementation of data base management packages and for information retrieval.

148. The need for hard disk on the microcomputer needs hardly to be justified. The hard disk will be needed to augment the limited capacity of the floppy disks and for use in storage of large files, e.g., the bibliographic data base or the library catalogue and associated indexes required for efficient retrieval. Most data base management pacakages on microcomputers would require hard disk storage for their efficient implementation. The tape or cartridge drive will enable the copying of the contents of the hard disk for back-up purposes.

149. The possibility for the Clearing House's microcomputer to function both as a stand-alone device and as a front-end to a minicomputer or mainframe system has already been dealt with.

150. The concept of distributed processing using both distributed computing power and centralised/decentralised files and printing facilities is an attractive one with several advantages. This kind of processing environment may be useful in the Clearing House with the different sections having independent access to their own microcomputer but sharing files. For instance the Acquisition System, Circulation System and Cataloguing System could each have their own processor/storage facility but all of them could share the library catalogue file. Only the Cataloguing System will have the authority to amend or update the catalogue file with other sections being allowed read-only access to the catalogue file. Local Area Networks are becoming popular in office automation but there is no reason why similar concepts and configurations should not be thought of in the activities of a Centre such as the Clearing House.

151. Representatives of well known manufacturers of microcomputers in Indonesia were contacted in order to obtain information of systems that could be acquired in Indonesia, the costs, and the kind of support that was extended to customers in Indonesia. Initial contact was to obtain trade and technical data about available systems. This was followed up with visits to a few representatives for discussions. The information collected is presented in Table-1.

152. All the systems described in the table are capable of emulating well known terminals, e.g., VT100, IBM3728, etc. All of them support one or more communications protocols enabling them to be used in access to data networks. All of them are capable of being used in Local Area Networks.

153. In addition to the above mentioned systems, data about a few

larger systems was also collected. These are systems which support more than one terminal and may be said to be smaller minicomputers in the 16-bit range. The systems considered were the ALTOS 986-40, ALTOS 586-20, and WANG 2200 LVPC/16E. Each of these systems costs between US$ 20,000 to US$ 30,000 depending on the features chosen. No further consideration was given to these systems since indications were available to suggest that these were outside the range of funding being considered.

154. Along with the purchase of the smallest configuration with hard disk (Col. 3 of Table-1), it would be necessary to acquire language compilers, operating systems and other utility software, e.g., a word processing package. The language compilers suggested are BASIC (and perhaps PASCAL) since a number of application programs useful in library and information work are available in these 2 languages. It is recommended that the following utilities be ordered with the system: (i) A word processing package, (ii) a mailing list software package, (iii) a generalized DBMS pacakage such as IV+V or Dbase II, and (iv) a generalized sort/merge package (if not included in the operating system or adequately provided for by the mailing list package). Among the operating systems, it is considered useful to have CP-M/86, MS-DOS on the UCSD p system depending on the software requirements. The relative cost of the total package, i.e., smallest appropriate hardware configuration plus useful compilers, operating systems and utilities of the four systems is given below.

APRICOT (16 bit system) Includes: 256 KB RAM; 1 Floppy drive of 315 KB; 1 10 MB Hard Disk; Keyboard, Monitor; MS-DOS, CP-M/86, Microsoft BASIC Supercalc (spread sheet)	$ 6420.00
Wordstar with mail merge	500.00
Dbase II	500.00
Mail list package	250.00
UCSD p system with UCSD PASCAL	900.00
Sort/Merge	250.00
Total	8725.00

DEC RAINBOW 100+ Dual Processor 8 bit and 16 bit
Includes: 256 KB RAM;
2 Floppy drives of 400 KB each;
1 10 MB Hard Disk;
Keyboard, Monitor;
CP-M/80-86, MS-DOS M-BASIC-86;

	US$
	6325.00
Wordstar with mail merge	500.00
Dbase II	700.00
Mail list package	250.00
UCSD p system with UCSD PASCAL	900.00
Sort/Merge	150.00
Total	8920.00

VICTOR
Includes: 256 KB RAM;
1 Floppy Drive of 1.2 Mb
1 10 Mb Hard Disk; Monitor;
Keyboard; CP-M/86, MS-DOS
Microsoft BASIC

	US$
	7600.00
Dbase II	500.00
Wordstar with mail merge	500.00
Mailing list package	250.00
UCSD p System with UCSD PASCAL	900.00
Sort/Merge	250.00
Total	10,000.00

IBM PC-XT
Includes: 2x64 KB RAM;
1 Floppy drive of 320 Kb
1 10 Mb Hard Disk;
Monitor, Keyboard;
PC-DOS V2.0

	US$
	7010.00
CP-M/86	350.00
Dbase II	500.00
BASIC Compiler	428.00
UCSD p System with UCSD PASCAL	900.00
Wordstar with mail merge	500.00
Mailing list package	250.00
Sort/Merge	250.00
Total	10,188.00

WANG-PC
Includes: 256 KB RAB;
1 Floppy Drive of 360 Kb
1 10 Mb Hard Disk;
Monitor; Keyboard
Operating System

	US$
	6075.00
Dbase II	500.00
Wordstar	500.00
Mailing list package	250.00
UCSD p System with PASCAL	900.00
Total	8225.00

TABLE-1

Sl No	Name of System	Smallest Appropriate Configuration (with Hard Disk and 256 KB RAM)	Cost of Configuration in Col.3	RAM Expandability	Hard Disk Expandability	Operating System Available	Software included in cost shown in Col.4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	CANNON AS-100 (INTEL 8088, 16 bit)	128 KB RAM; 2 Mini floppy drives, double sided 640 KB; 10 MB	$11400.00	Upto 512 KB		CP-M/86,MS-DOS, UCSD p system	CP-M/86, MS-DOS, UCSD p system
2.	VICTOR (INTEL 8088 16 bit)	256 KB RAM; 1 Mini floppy drive, double sided of 1.2 MB; 10 MB Hard disk	$ 7600.00	Upto 896 KB	Upto 40 MB	CP-M/86, MS-DOS UCSD p system	CP-M/86, MS-DOS UCSD p system MBASIC-86
3.	IBM PC-XT (INTEL 8088 16 bit)	256 KB RAM; 1 Mini floppy drive, 320 KB, 10 MB Hard disk; keyboard; Monitor	$ 7300.00	Upto 640 KB	Upto 20 MB	PC-DOS, CP-M/86, UCSD p system	DOS V2.0 MBASIC-86
4.	APRICOT (INTEL 8088 16 bit)	256 KB RAM; 1 Mini (3.5") floppy single sided 315 KB drive; 10 MB hard disk; keyboard; Monitor	$ 6325.00		Upto 20 MB	CP-M/86, MS-DOS 2.0 Microsoft BASIC	CP-M/86 Microsoft Basic Supercalc Superplanner
5.	RAINBOW 100+ (Dual processor 8 bit & 16 bit)	256 KB RAM; 2 Mini floppy drives of 400 KB each; 10 MB Hard disk; keyboard; Monitor	$ 870.00	Upto 896 KB	Upto 20 MB	CP-M/80-86, MS-DOS UCSD p system	CP-M/86, MS-DOS MBASIC-86
6.	WANG PC (INTEL 8086 16 bit)	256 KB RAM; 1 Mini floppy drive, 320 KB; 10 MB Hard disk; keyboard; Monitor	$ 6075.00	Upto 640 KB		MS-DOS CP-M/86	MS-DOS WORDPROCESSING MULTIPLAN BASIC Interpreter

155. The figures for the cost of hardware and software have been taken from data supplied by manufacturers or their representatives. In a few cases data for specific software (e.g. Sort/Merge) was not available for some systems (Apricot, IBM PC-XT, Victor, and Wang). An average cost for such software has been assumed.

156. Certain computers have better hardware features than the others in particular respects. For instance the Rainbow has 2 floppy drives as against 1 drive in the other 4 makes. It is considered useful that there should be 2 drives as this would ensure that inspite of hard disk failure, jobs which do not require hard disk could continue to run on the system. A 2-drive system would permit using 1 drive for the operating system and the other would be free to hold one or more data files and application programs. A single-drive system may limit the usefulness of the microcomputer in the Clearing House where even small applications (e.g., Mailing List Management) would require 1 drive exclusively for storage of data. Also since applications in the Clearing House would involve sorting and merging, it would definitely be advantageous to have 2 drives as against 1 drive to ensure that sorting of files could be possible even without the hard disk. The Rainbow 100+ also has a dual processor (Z80A and INTEL 8088) and thus is capable of running software developed for 8 bit as well as 16 bit machines. The CP/M-86/80 operating system detects whether an 8 bit or 16 bit programme is loaded and invokes the correct processor to run that software. This allows the use of software pacakages from a wide range of suppliers without the need to swap diskettes.

157. On the other hand the Victor gives the greatest possibility for extension of disk storage, and the Apricot and Wang models appear to be designed for greater user comfort. Although all of the computers studied are compatible with a wide variety of software and peripheral equipment, the choice of an IBM PC-XT would probably be optimal if this factor were given greatest priority.

158. The final choice of a microcomputer for the Clearing House will need to take into account ruling prices at the time of the decision to acquire the system and the funding actually available, as well as preferences regarding hardware facilities and specific software packages. The requirements as spelt out in this chapter will hopefully facilitate the choice of a suitable system.

159. In addition to the above-mentioned hardware and software, there is need to provide the system with a letter quality printer. The choice of a printer is better made after the microcomputer to be acquired is finalised. A good quality matrix printer or one with interchangeable daisy wheels or thimbles would cost in the range of US$ 1200 to $ 1500 (the advantage of a matrix printer is that it is generally much faster and more reliable, although the quality of print will probably not be quite as good as that of a daisy wheel model).

160. An estimate of $ 10,000.00 for a microcomputer system, letter-quality printer and associated system and utility software is considered to be a realistic figure. It is recommended that a request for multilateral or bilateral aid be made for the acquisition of a

microcomputer and associated information handling equipment for the Clearing House.

Software considerations

161. The IV+V system software package which is a generalized data base management system intended primarily for bibliographic applications and specifically for use on microcomputers has all the necessary features for it to be used in automating the Cataloguing System and the system for date base creation, SDI provision, current awareness listing, and interactive search. Unesco is presently sponsoring several pilot projects in developing countries using this system, with a view to possibly employing it in a wider range of projects in the future.

162. The IV+V system can, through its mask editor, create the user-friendly screen images necessary in the data entry operations of the above systems. The data base processor of the IV+V system through its data description facility, can create structured records in the data base and define appropriate relations. The IV+V system provides the system designer the flexibility to define any data element for indexed access. The data base processor enables the processing of queries using indexed access; in addition it enables the use of data elements that are not designated as index keys in searching the data base and permits term truncation. The I/O processor of the IV+V system enables the formatting of print files to suit the different printed outputs envisaged such as catalogue cards, accession lists, current awareness lists and bibliographies. The features necessary for the cataloguing, SDI and interactive search systems proposed are thus available using this package. The IV+V system is also intended to enable the creation of files in communications compatible formats. Such a capability would require the writing of a processor to translate from the internal format of the IV+V system to that of the desired communication format. In the reverse direction it would be possible to read a file in communications compatible format and convert this to the internal format of IV+V. Such a facility would permit the use of downloaded data from an international data base such as AGRIS.

163. The cataloguing system, data base creation, SDI and interactive search system, and the on-going research information system may be considered to be natural candidates for implementation using the IV+V. The extent of the effectiveness and usefulness of the systems implemented using IV+V would depend to a great deal on the skills of the system designer in translating the broad requirements outlined in this report into specific and detailed implementation specifications. In addition the designer would need to have the skills and knowledge of the different modules and capabilities of the IV+V system to be able to use it to translate the implementation specifications into user-friendly systems that will meet different requirements and produce outputs of the kind and quality desired.

164. The IV+V system may also prove capable of creating and maintaining the Clearing House's thesaurus file. Some special

programming effort, however, may be required to generate entries for inverse relationships. For instance when a new network terms is entered into the thesaurus it contains the lead term and other terms related to the lead term in different ways, e.g. as broader terms narrower terms, etc. The automated system should generate entries for the inverse relationships and merge these with other relationships, if any, already existing. This kind of a requirement is quite unique to thesaurus development work. The consultant is not aware whether this kind of a requirement can be met by IV+V through special programming effort.

165. In a similar manner, it is possible to think also of implementing the serials control system using IV+V. Here again, however, there may be a need for programming effort to implement the claims module, preparation of binding lists, etc. where outputs are produced based on conditions that need to fulfilled by the different records in the file. How these conditions will be represented using the IV+V package will determine whether or not it can be used for automating the serials control function. The consultant is aware that a generalized DBMS such as the Dbase II has been used for some aspects of Serials Control. A more intimate knowledge of IV+V would be needed in applying it to automate the serials control function.

166. In view of the obvious advantages and usefulness of the IV+V system software package in implementing the proposed automated systems in the Clearing House, it is strongly recommended that the package be provided to BIOTROP under Unesco auspices after ensuring that terms and conditions for the use of the package are mutually agreed. Expertise would also need to be provided in system design using the IV+V system. and in the development and maintenance of applications using this package. These aspects are discussed in the Chapter on the proposed plan of action.

167. There are other options available for implementing the thesaurus creation and serials control systems. Specific packages do exist for each of these functions and may be acquired if funds are available. Development of new systems specifically for the Clearing House is ofcourse possible but not recommended as this would mean considerable skilled programming effort and may in the long run be more expensive than a proven and available package.

168. The exchange and mailing list management system does not require any special programming effort. A commercially available package, (e.g. List Manager on the Rainbow 100+) would provide all the necessary features required to automate the creation, maintenance searching and outputs required by the Clearing House.

169. A popular word processing package such as the Wordstar would meet the requirements of the publication section of the Clearing House in creating its text files, in editing the same, in formatting the fles, and finally in outputting the files to the quality printer to be used to produce offset masters.

170. It is well known that once people begin using computers and gain confidence in their use, more areas of work will be attempted to be

automated. Some of these areas may not require extensive programming effort and could easily be implemented using a generalized file and data base management system. It is with this in view that a very popular and easy to use package such as the Dbase II has been suggested as a possible supplement or alternative to the IV+V system. Computer-aided instructional packages are available for learning the use of Dbase II in addition to books and manuals on the subject. This package if acquired for the Clearing House could also be used by other divisions of BIOTROP.

Offline use of external data bases

171. The Clearing House uses the following data base services in an offline mode to meet expressed needs and for current awareness provision.

- AGRICOLA
- AGRIS
- International Plant Protection Center's (IPPC) data base on Aquatic Weeds at the University of Florida

172. Output from the AGRICOLA data base of the National Agricultural Library (NAL) of the United States is received every month under the NAL's KWIK Update searches provided by Harry Dewey, NAL's contractor, to developing country institutions. The KWIK Update searches are the result of standard search profiles run against the AGRICOLA data base every month. The following KWIK Update searches are being received by the Clearing House:

- Urban Forestry
- Nitrogen Fixing Trees
- Pesticide Residues
- Natural Plant Insecticides
- Agricultural Development

173. The search outputs are sent to the appropriate programme leaders who in turn circulate the outputs to scientists. The outputs in each of the above mentioned areas are quite substantial since the profiles on which they are based are very broad. As a result, the response to these outputs from BIOTROP scientists has been poor.

174. The AGRIS data base has been used through the Agricultural Information Bank for Asia (AIBA) which receives a subset of the AGRIS tape relating to Asia. The Clearing House has requested AIBA for retrospective searches of the tapes. The searches have been found very useful by the scientists at BIOTROP.

175. IPPC offers a quarterly bibliography update service to scientists working on aquatic weeds. The user is expected to send to the IPPC the name of the plant(s) and category or categories of information relating to that plant of his interest. The quarterly update service provides the user with a list of references to journal articles, books and other publications added to the IPPC and relevant to the user. The service is provided free of cost.

176. A few scientists in the Aquatic Biology Programme were recipients of the IPPC's quarterly update service. Two of the recipients of the service were interviewed and both the scientists found the service extremely useful in alerting them to literature in their areas of work and specialization. The scientists raised a related issue, viz., of access to originals once they identified useful new literature in outputs such as that received from IPPC. They felt that unless the Clearing House was provided adequate funds to quickly acquire copies of documents the usefulness of access to external current awareness or search services would be limited.

177. The use of external data base services has certainly enabled the Clearing House to meet several requests which on its own it may not have been able to meet. The fact that scientists have found these external services useful and look forward to receiving them is enough justification for the Clearing House to cultivate these services and utilise others not already tapped for the benefit of scientists at BIOTROP and elsewhere in the region.

178. In the interviews that were had with the four scientists at BIOTROP, they were specifically asked to estimate the amount of time they spent in searching for information and the extent of their dependence on the Clearing House to help meet their information needs.

179. All of them indicated that they spent on an average of up to one week in a month on searching for literature and in browsing through current literature. Those who received outputs from IPPC mentioned that they spent at least 3 or 4 days in a month going to other libraries in the Bogor area in search of the journals in which useful articles had appeared and had been seen in their printouts. This had to be done by them since some of the journals were not being received at the Clearing House or were received late.

180. Three out of the four scientists interviewed indicated that they searched the literature on their own using the resources of the Clearing House and that of other libraries in the Bogor area. Literature searching was resorted to both before and during the tenure of a research project. Searches before the research project were made to obtain a relatively comprehensive overview of the area of the work while searches during the project were to obtain very specific information, e.g., on a methodology, or for information on results of similar experiments obtained by others. The scientistis estimated the time they spent on comprehensive searching of literature to be in the region of 4 to 6 weeks in a year since the work involved the going through of several years of abstracting journals at BIOTROP and in other libraries.

181. All the scientists interviewed expressed the view that it would save them considerable time and effort if the Clearing House was able to do the literature searches for them using the resources of the Clearing House and other libraries in the Bogor area. None of the the scientists inverviewed was aware of online search systems and the possibility that data bases such as the CAB, BIOSIS, AGRICOLA, CRIS, etc., could be searched for comprehensive or problem-oriented searches of information. When the process of accessing such data based was

explained all the scientists were unanimous in the view that it would be extremely useful for the Clearing House to access the data bases for information searches.

Feasibility of on-line use of data bases

182. INDOSAT, a quasi governmental organization responsible for providing satellite telecommunication services within the several islands of Indonesia and with overseas centres was visited primarily to find out the policy concerning data communications and facilities if any for accessing data networks outside Indonesia.

183. Since July 1984 the INDOSAT has begun offering access to data networks outside Indonesia through the voice grade public switched telephone network (PSTN). In fact the INDOSAT had just launched a campaign to promote awareness of the new service and during the campaign which is to last for 6 months, the rates for access would be very nominal to help users get familiar with the service the INDOSAT had plans to organize lectures and discussions concerning the service in user organizations and offered to visit BIOTROP if invited.

184. The service is modelled after the DATEL service of the Telecoms, the Singapore post and telecommunication organization.

185. Subscribers will be able to access host computers in other countries in the following ways:

- Through the International PSTN either by International direct dialing (IDD) or with operator assistance

- By dialing the Indonesian data exchange

- By using approved and suitably equipped leased lines

186. The first two access methods are for occassional users who have a small volume of traffic. Transmission speeds of up to 2400 bps are expected to be attainable, although speeds of 300 and 1200 bps using asynchronous data terminals would be more commonly used.

187. A variety of terminal equipment is possible to be used including portable data terminals with acoustic couplers and inbuilt modems. Such terminals could be imported by subscribers with prior approval of the INDOSAT. Hard copy terminals (KSR 80/132 300 bps and 1200 bps) are available on hire from the INDOSAT. Subscribers may also acquire their own modems with prior approval of INDOSAT as long as the modems comply with the technical standards set by INDOSAT. The INDOSAT was willing to advise on interfacing the Clearing House's microcomputer with the International PSTN for access to data networks outside the country.

188. Rental changes for terminals and modems would depend upon the speed of the terminal and would be in the range of Rp 180000 to Rp

300000 per year (US$ 180 to 300 per year) for terminals, and between Rp 150000 and Rp 250000 per year for modems.

189. Access to the Indonesian data exchange will be provided through public or private dial-up ports over the PSTN. A charge of about Rp 25000 (US$ 25) would be charged as monthly access charge to the exchange.

190. The telecommunication cost for using an international data base service, e.g., DIALOG in the USA through the data exchange will come to about $45.00 per hour assuming that the full capacity of the speed of the trasmission line will be used.

191. The breakup of costs for a typical search of a system such as DIALOG using the INDOSAT services is given below:

	US$
15 min. Connect Time @ $ 1.00 per minute	15
Output cost of 200 references with abstracts at $ 0.25 per reference	50
Telecommunication cost @ $ 45.00 per hour	12
Total	77
Say US$	80

192. Assuming that the Clearing House will be requiring to do about 2 searches a month the total cost of providing on-line search services in a year would be as follows:

	US$
Cost of 24 searches at an average cost of $ 80.00 per search	1920
Rental for Modem @ $ 200.00 per year	200
Rental for Terminal @ $ 250.00 per year	250
Monthly access charges @ 25 x 12	300
Administrative and other costs @ 10% of 1+2+3	213
Total	2883
Say	US$ 2900/year

193. Microcomputers are being increasingly used to access on-line systems. Communications software is now becoming available for microcomputers to be able to automatically logon to a host computer using stored messages. It is possible to create and store a priori the text (e.g., search strategy statements) which is to be communicated after connection to the host is established. Depending upon the speed of the communication line used, it may even be cost-effective to capture the output from the host onto the microcomputer diskettes. This output could then be edited and annotated before handing it over to the end user.

194. The use of a microcomputer as an intelligent terminal to an on-line system enables the fuller use of the speed of the transmission line thereby considerably reducing the connect-time costs. Well known data base distributors such as DIALOG, ORBIT, and BRS have already issued detailed instructions on how microcomputers may be used to access their systems.

195. The Clearing House has the skilled manpower to be able to conduct on-line searches for the benefit of users not only at BIOTROP but others in the region. The intelligent use of on-line search services is considered to be an important means of comprehensive access to relevant information for research, development and problem solving. Considering the fact that researchers in developing countries do not have the same opportunities for interaction and discussions with their peers as their counterparts in developed countries, the need for good access to formal information systems is perhaps much more important than is recognized by research organizations in developing countries. The consultant's experience of providing search services using on-line systems in a public sector industry in India has been that such services are useful in the following ways:

- The outputs providing a comprehensive overview of published and unpublished information, selected if necessary from one or more multi-disciplinary data bases, enable the research team to plan their projects more realistically than without such information. By realistic planning is meant delineating the objectives and scope of the project and the take-off stage for the project--i.e., what aspects of work already known is necessary to be repeated, what work and results known can be accepted, and the methodologies and approaches which seem to be most appropriate for the project. The outputs have also been known to suggest appropriate instrumentation, equipment and numerical techniques that could be used by the project team. The outputs also enable a realistic estimation of the time duration of the project.

- The outputs can alert the research team to key researchers and key papers thereby paving the way for the establishment of communication that could significantly benefit the research.

196. The cost of on-line searches may appear to be high when looked at in absolute terms. However, it is believed that manual searches, especially when they are done by scientists themselves, if properly cost analysed for skilled manpower time, will usually work out to be as expensive, if not more, as on-line searches. Another important aspect that tends to be overlooked in developing countries is that a skilled scientist or manager who is waiting to be provided with information can be more expensive in hidden costs of under utilized expertise than the costs of on-line searches.

197. The provision of search services using on-line systems by the Clearing House not only to users at BIOTROP but to others in the region will add a new dimension to its services. Such services to users outside BIOTROP may be charged to recover costs. The availability of access to data networks at a reasonable cost (15% of search cost is communication cost) has made on-line access to international data bases a viable proposition in Indonesia.

Priorities in implementation

198. The suggested priorities in implementing the different automated systems is given below:

- System for data base creation, SDI and current awareness provision
- Cataloguing system
- Thesaurus development system
- Serials control system
- On going research information system
- Mailing and exchange list management system

199. Systems which will provide benefits to the end user have been given higher priority than the others. The higher priority systems are also more complex from the point of view of their design and implementation.

Plan of action

200. The action plan to implement the above-mentioned automated systems is best broken up into the following phases of activity:

- Preparation of specifications, tendering and ordering the microcomputer hardware and software
- Design and development
- Testing and evaluation
- Training of manpower
- Implementation

201. The above phases need not necessarily follow one another. Some of them may run in parallel with others. For instance the training of Clearing House manpower may be done by associating them in the design and development phase and in the testing and evaluation phase. Similarly, the design phase need not wait for the tendering and ordering of the microcomputer to be completed.

Preparation of specifications and tendering for a microcomputer

202. The report has already delineated the major requirements to be

met by the microcomputer for the Clearing House. The specifications document may contain, in addition, specific information about support of interfaces and communication protocols required for access to host systems within Indonesia and outside the country. This information will need to be acquired from the INDOSAT. The specifications document should also include maintenance support expected and other guarantees. The preparation of specifications and tendering for the microcomputer should not take more than 1 week of work.

203. Eight to ten weeks after the placement of a firm order was indicated by most representatives to be the delivery period for a microcomputer.

Design and development

204. It is assumed that the design of the automated systems in the Clearing House will be done for implementation using the IV+V. This would considerably reduce the time required to design the different systems as compared to developing the systems using conventional programming languages and techniques.

205. It would be necessary, however, for the system designer to convert and interpret the broad requirements specifications provided in the report into detailed implementation specifications specifically for use with the IV+V package.

206. The implementation specifications are considered as comprising the following:

A. A detailed description of the output products required from the system

207. The output products include printed output to be produced by the system as well as all machine readable files that will be created. The machine-held files will include transaction files as well as master files.

208. The type of information to be included in the description of the output products is as follows:

- The purpose for which the output is needed
- The data elements which each record on the output is to contain
- A print layout chart for each printed product
- Estimate of the size and volume of the output products (no. of records, size of each record and total size of output and expected rate of increase). Some information about this is already given in this report
- The details of machine-held output files giving the

name of the file, size, retention characteristics and back-up procedures

209. The detailed description of printed output products will be used by the Printer Processor of the IV+V to generate print image files in the formats required.

B. A detailed description of the nature and sources of data to be used in the system

210. Some description of the nature and sources of data have already been given in this report. The system designer would need to define these in greater detail and where necessary design also the forms and worksheets to be used in the different systems.

211. It is necessary to define the data elements for input records including for each element; its length, type, validation criteria if any, whether mandatory or optional, and whether the element is a repeating field, whether it is to be indexed; and its relationship with other data elements. In a package such as IV+V the Data Base Definition Facility will probably prompt the data entry operator to input the above mentioned attributes for each data element. It would therefore be useful for the designer to specify in detail the elements in the different input records for a given system.

212. In addition to specifying in detail the different attributes of the data elements there is need to design the instruments to capture needed input data. For instance a cataloguing worksheet would be required. Also a form for the description of user interests to be used in creating the SDI profile would be required to be developed. Similar worksheets and profile development forms used in other contexts may suitably be modified or adopted to the needs of the Clearing House.

C. A detailed description of the functions and, where necessary, the processing logic or algorithms required in order to achieve the objectives of the system

213. It will be required in the Cataloguing system, for instance, to specify how to generate the tracings fields, and what fields will constitute the headings.

214. Algorithms may be required to be specified, for instance, to convert the search expression in the SDI profiles to a form suitable to be handled by the Data Manipulation Faculty of the IV+V.

215. The design and development activity envisaged is specifically oriented to using the capabilities of a package such as IV+V and hence will need to be done by a specialist knowledgeable in the features, capabilities and limitations of the IV+V. Such a specialist would need to work closely with the professional staff of the Clearing House in defining and detailing the outputs, nature and sources of input data, and functions/processes required to meet the objectives of the different systems.

216. The present feasibility study will hopefully provide the basis for the specialist and the professional staff of the Clearing House in describing in detail the proposed outputs, characteristics of input data and functions required to be performed by the different systems.

217. It is suggested that a specialist in IV+V may be provided to the Clearing House to work closely with the professional staff of the Clearing House to define the implementation specifications for use with the IV+V. The specialist will then work in his own institution on the design of one or two systems using the implementation specifications and his expertise with the IV+V. This phase of the specialist's work will include also the testing of the modules developed. It is assumed that the specialists' institution would have access to IV+V and a suitable microcomputer. The specialist then returns to BIOTROP for a second phase of work after the microcomputer has been received and the IV+V installed at BIOTROP. In this phase he tests the applications developed by him. This phase of work also involves on-the-job training of the Clearing House staff in data entry, query formulation, procedures to specify different outputs, and generally in working with the two systems developed. It is suggested that the cataloguing system and the system for the creation of the data base, SDI and interactive search may be developed and tested in this phase. Once the systems developed are tested on site, the specialist then implements the systems, ensuring that existing procedures which the automated systems will ultimately replace, will continue to be run in parallel until the new systems may be considered to be error-free and stable in operation. The second phase of work of the specialist is estimated to be of 10 weeks duration.

218. The specialist in IV+V could be drawn from the IMD which has the expertise in IV+V and in designing systems using the IV+V.

219. The whole project is expected to take about one year and envisages that the specialist will work closely with the professional staff in all the phases of the project, viz., the design, testing, training and implementation phases. It is considered that the close involvement of the Clearing House staff with the specialist would promote a better understanding of the capabilities and requirements of the systems developed, and would ensure that the Clearing House staff gets the necessary confidence to take over and run the systems developed at the end of the project.

Training requirements

220. In addition to the on-the-job training envisaged, there is need to train one of the Clearing House's professional staff in the IV+V. The training may include a general introduction to the concepts of Relational Data Base Management Systems, and specifically to the different modules of the IV+V. Application Programming using the IV+V may be dealt with the training using practical examples of operational or demonstration systems in the acquisitions, serials control, and thesaurus development work.

221. The training in IV+V might be possible in one of the courses

held for the benefit of developing country library and information professionals. It is recommended that a fellowship be provided to a staff member of the Clearing House for such training. Further it is recommended that a professional from the scientific information and documentation section of the Clearing House with a postgraduate degree in Information Science may be deputed for the training. Such a candidate would have the necessary background to benefit from the training in IV+V.

222. Training within Indonesia for the use of packages such as the WORDSTAR and Dbase II will also be required. Computer manufacturers or their representatives in Indonesia have the facilites for such training. In addition, computer consultancy firms also offer short coureses. Deputation of clerical and professional staff for such training may be considered by BIOTROP.

Budget considerations

223. The following are the estimated costs of the different components of the project:

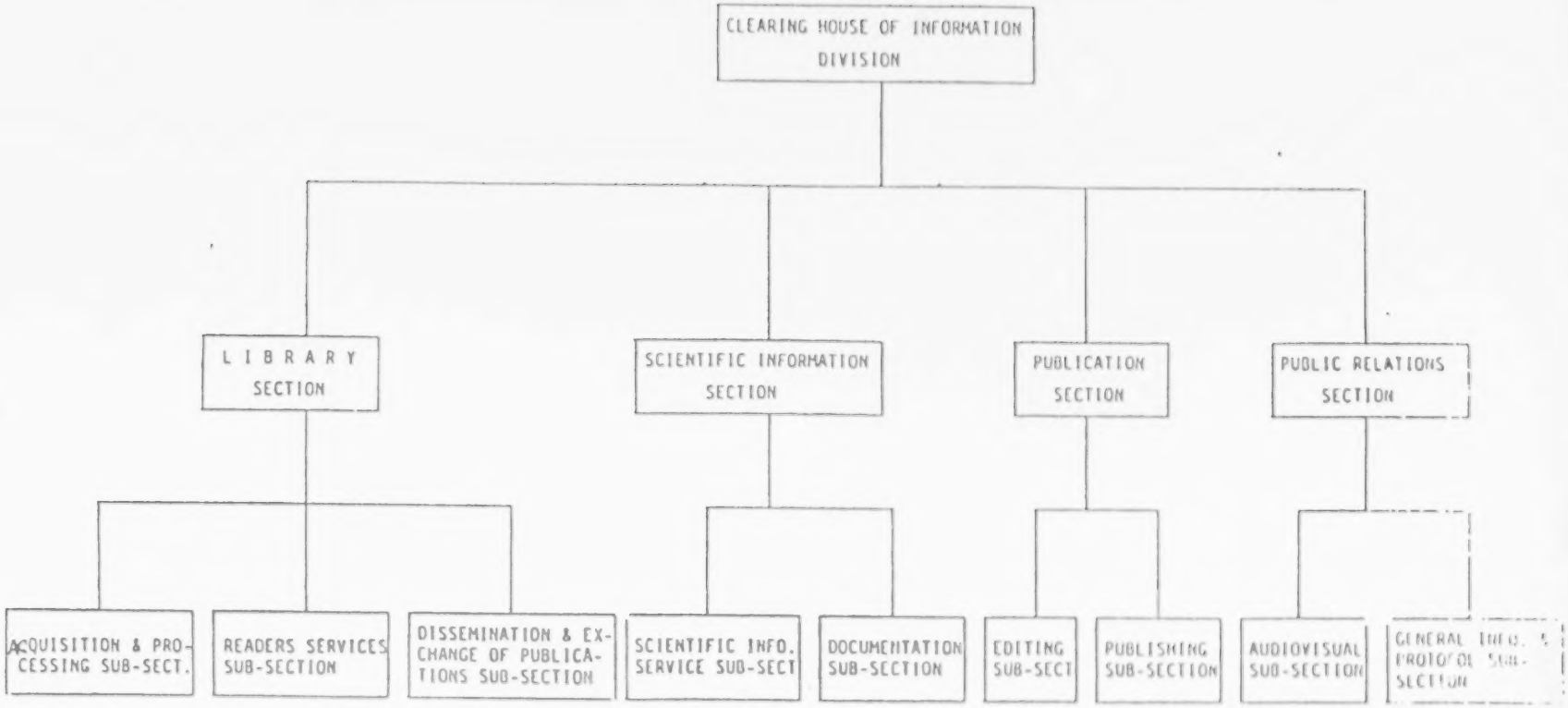
1. Microcomputer hardware, software, and a letter quality printer	$10,000
2. Plain paper copier (for paper master making)	$ 2,000
3. Training of One staff member in IV+V (Travel and per diem for 2 weeks)	$ 2,500
4. Training within Indonesia	$ 500
5. Approximate cost of expert for 4 weeks of on-site work and off-site work, travel and per diem for 2 missions of 10 days each (perhaps one mission of the responsible BIOTROP staff member to the specialists' institution and another of the specialist to BIOTROP)	$ 6,000
Total	$21,000

224. The costs of items 1 and 3 might be obtained through multilateral or bilateral aid, while BIOTROP may consider meeting the costs of items 2 and 4 in full. The costs of item 5 might also be obtained through multilateral or bilateral aid. IDRC proposes to support a project to develop a Regional Weed Science Information Centre at the BIOTROP. The availability of a microcomputer at the Clearing House and a system for data base creation, SDI, and capabilities for interactive searching of the data base would undoubtedly contribute to the objectives of a Regional Weed Science Information Centre.

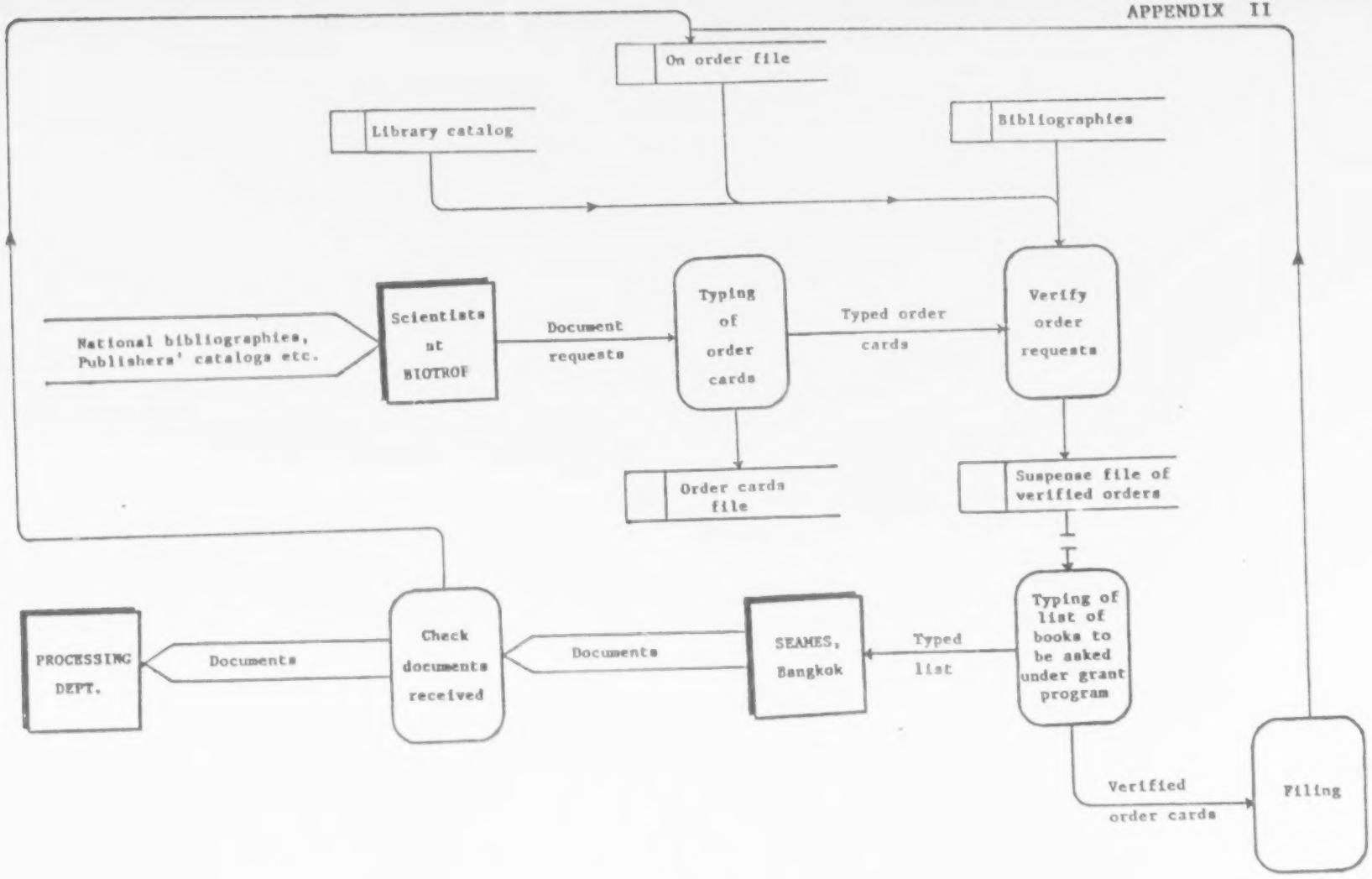
225. Also the project to introduce microcomputer-based systems in the

library and information fields at BIOTROP will be a test bed for a sophisticated package such as the IV+V. The experience gained using the IV+V in this project would be valuable and would enable in its transfer to other specialized centres in S.E.Asia and elsewhere, and is thus eminently in keeping with the objectives of ASTINFO.

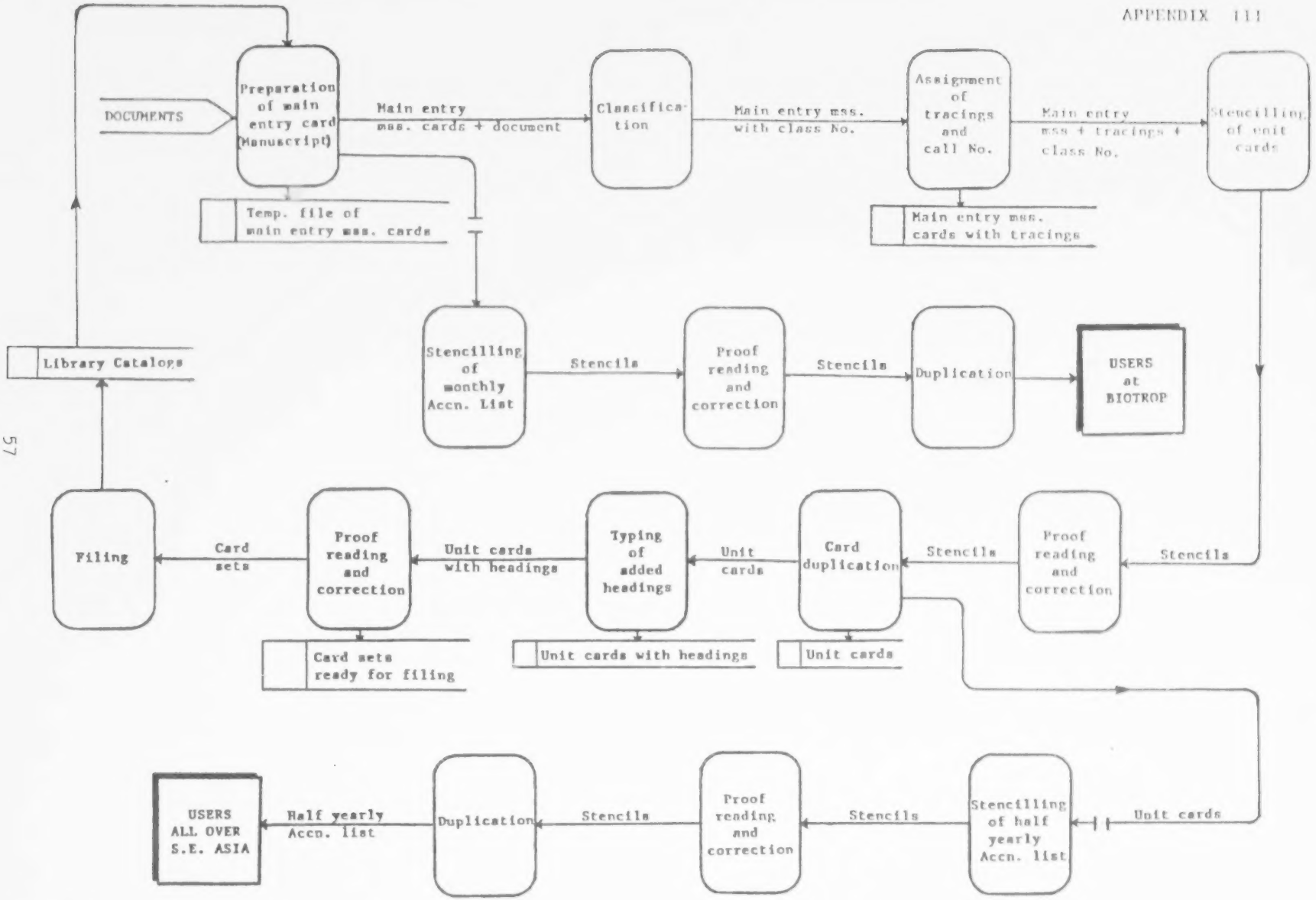
Appendix I



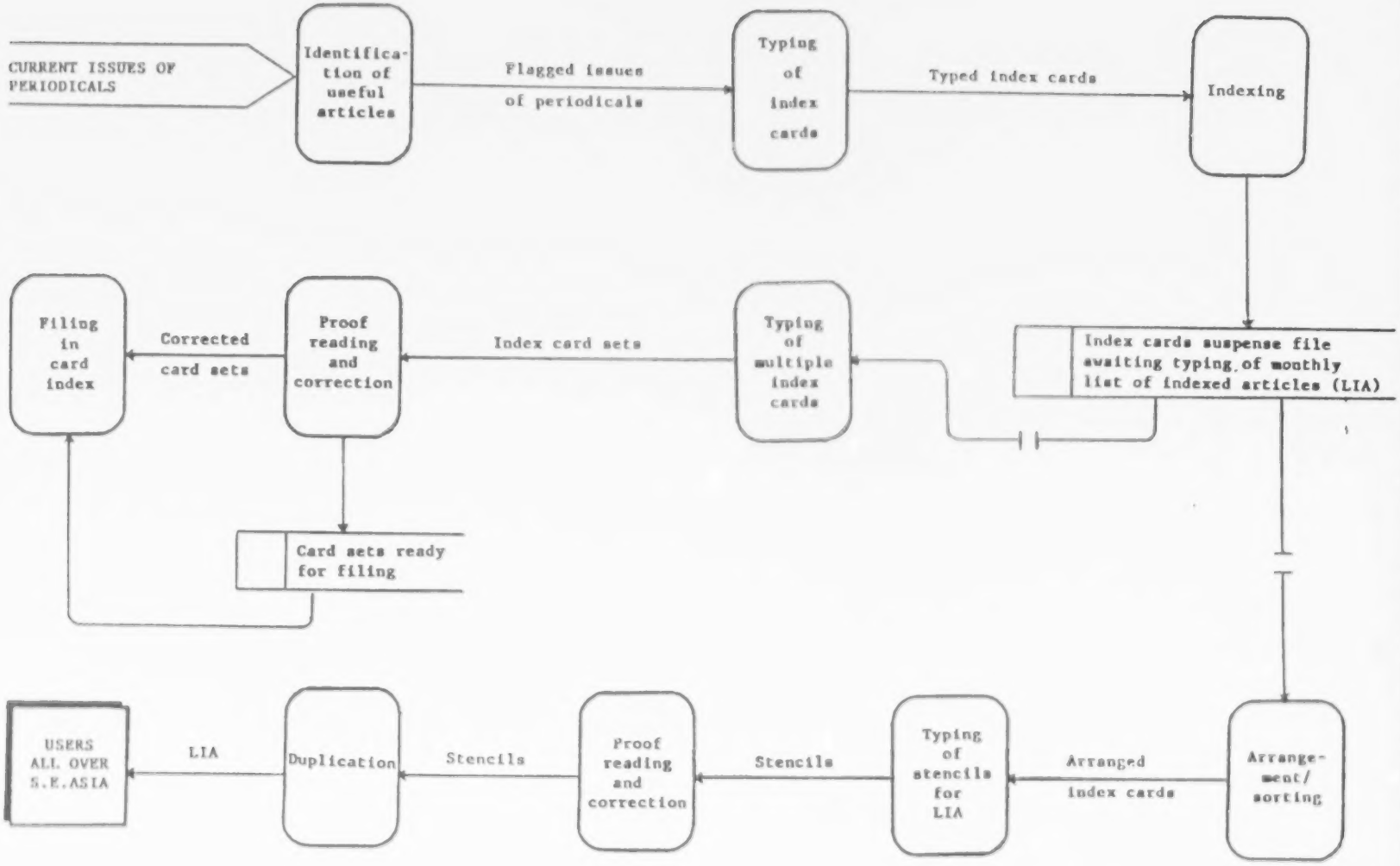
ORGANIZATION AND STAFFING CHART OF THE CLEARING HOUSE OF THE BIOTROP INFORMATION DIVISION



DATA FLOW DIAGRAM OF EXISTING PROCEDURES WITHIN THE BOOK ACQUISITION FUNCTION AT THE CLEARING HOUSE, BIOTROP



DATA FLOW DIAGRAM FOR THE CATALOGUING AND ACCESSION LISTING FUNCTION AT BIOTROP



DATA FLOW DIAGRAM OF EXISTING PROCEDURES FOR DATABASE (CARD INDEX) CREATION AND PRODUCTION OF MONTHLY LIST OF INDEXED ARTICLES

Documentation code :

Date received :

RESEARCH PROJECT REPORT

1. Type of Project . . . . . .
2. Preliminary/progress/final report of . . . . . .
3. a. Project No. & Title . . . . . .
   . . . . . .
   b. Sub-project No. & Title . . . . . .
   . . . . . .
4. a. Overall duration . . . . . .
   b. Phase of operation . . . . . .
5. a. Main objectives . . . . . .
   . . . . . .
   . . . . . .
   b. Sub-project objectives . . . . . .
   . . . . . .
   . . . . . .
6. a. Project Leader . . . . . .
   b. Members :
   Supervisor/Consultant . . . . . .
   Scientist . . . . . .
   Research assistant(s) . . . . . .
   . . . . . .
   Technician(s) . . . . . .

---

7. Report :

8. Field trips :

Venue	Date	Objective(s)
. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .

9. Other activities : . . . . . .
(in line with the . . . . . .
project) . . . . . .

10. Publications : . . . . . .
(Author, title, ...
published in) . . . . . .

11. Any cooperation with: foreign . . . . . Partly financed
foreign agencies . . . . . .
domestic . . . . . domestic . . . . . .

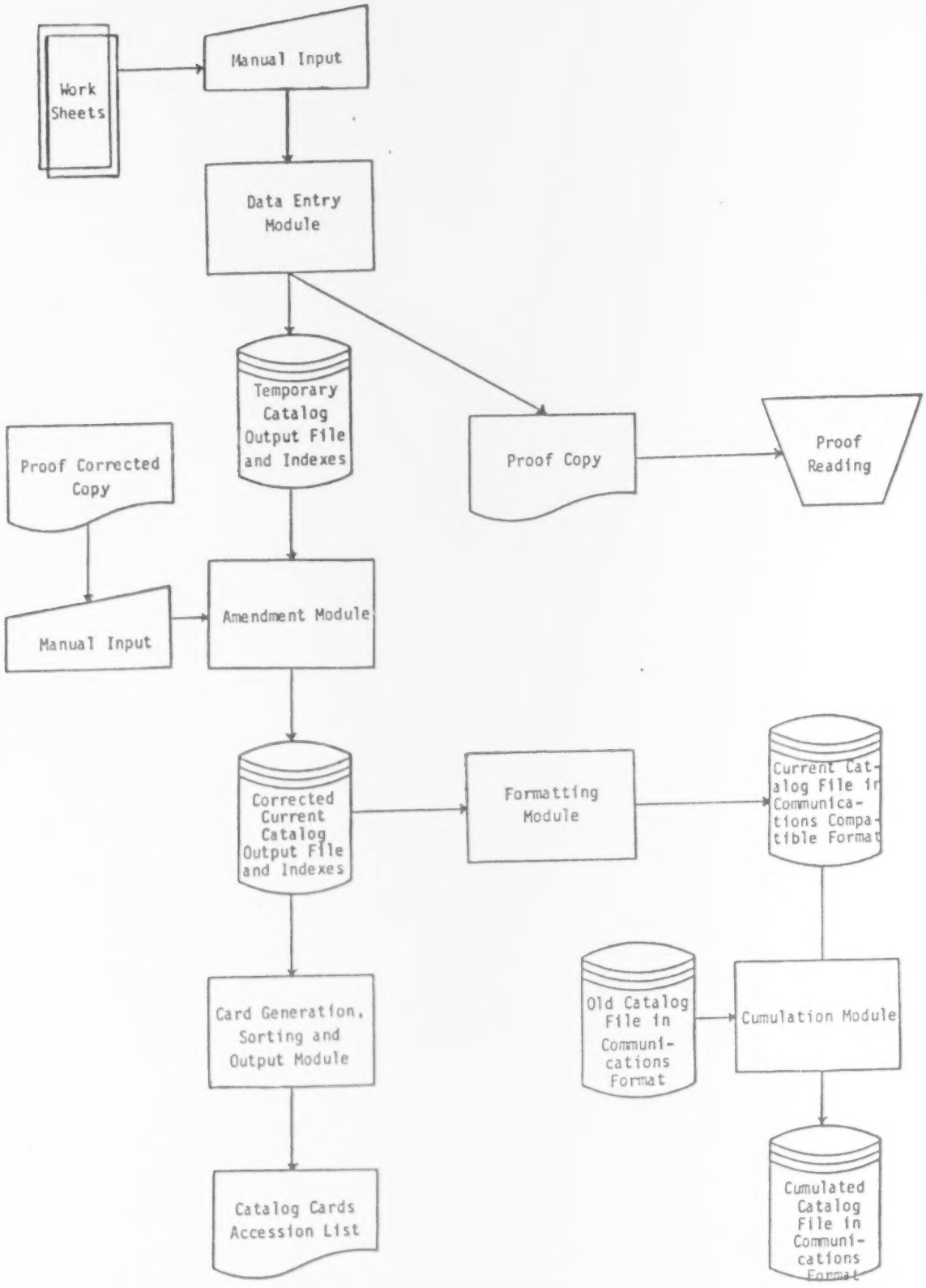
Reported by

. . . . . .
(Project leader)

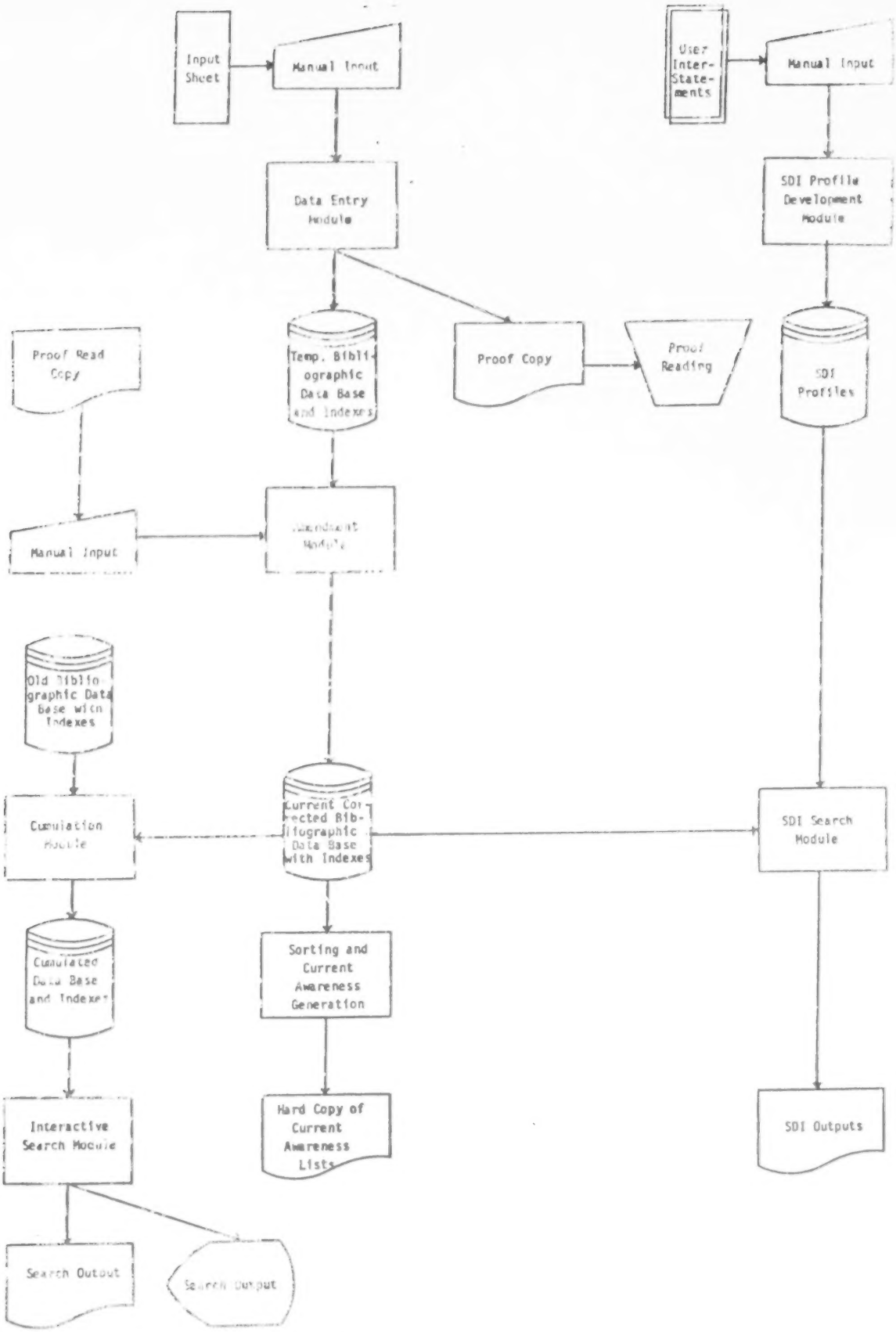
Date of reporting : . . . . . .

Remarks :

1. Fill out all necessary information in the preliminary report
2. Fill out only item 1, 2, 3, 4 and 7 for the following phases
3. Submit the typed report to the Deputy Director through the Program Managers and keep one copy for your own file
4. Submit the report not later than . . . . . .
5. If one sheet is not sufficient, use an additional blank paper
6. The report must be completly filled out in English.



SYSTEM FLOW CHART OF PROPOSED CATALOGUING SYSTEM



SYSTEM FLOW CHART FOR THE INTEGRATED DATABASE CREATION, SDI, CURRENT AWARENESS LISTING, AND INTERACTIVE SEARCH SYSTEM